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VOLUME 224 FEBRUARY 20, 1941 NUMBER 8

FAVORABLE TYPES OF BRAIN TUMOR AND THE RESULTS OF THEIR OPERATIVE REMOVAL*

GILBERT HORRAX, M.D.†

BOSTON

ALTHOUGH it is within comparatively recent years that the natural history and useful survival periods of patients harboring various types of brain tumor have been the subject of investigation, the published reports have been surprisingly few. The vast majority of these have come either from Harvey Cushing himself or from his pupils. In van Wagenen's[1] report in 1934 of 149 cases from Cushing's clinic seen eight years previously, the survival rate for all types of tumor (benign and malignant) was 35 per cent. From a review of this material it appears that 75 patients — roughly half — had what might be called "favorable tumors." Of these, 45, or 60 per cent, as nearly as can be made out, were leading useful lives.

In 1936 Cairns[2] made a somewhat similar though more exhaustive study of 157 cases seen in Cushing's clinic nine years previously. There were 22 postoperative deaths, leaving 135 patients on whom the study was chiefly based. Sixty-three of these patients were living at the nine-year interval, giving a survival rate for the entire series of 40 per cent. It is difficult to estimate the number of patients out of the original 157 who had favorable tumors, but from the tabulation it is safe to say that 78, or about half, harbored growths of this character. Cairns estimates that 37 patients were leading useful lives at the time of his study, and since these were all among the favorable tumors, 47 per cent, or nearly half, apparently came into this category.

The conclusions that I have drawn from the data given in Cairns's and van Wagenen's papers are at best only rough estimates, but I think that one is justified in saying that at least 50 to 60 per cent of the patients having favorable tumors in these reported series were living useful lives eight and nine years after operation. That this percentage was not considerably higher I take to be owing to two operative features that show the advances in neurosurgery. First, in the years that both these series of cases were operated on, transsphenoidal operation for pituitary tumors was being used. The results from this type of operation, although at times brilliant, were on the whole far less complete or permanent than the intracranial operation later used by Dr. Cushing and now almost universally employed by all neurosurgeons. Secondly, the operation for acoustic neuromas was, in those years, the so-called "intracapsular extirpation." By this means a shell of tumor with a greater or lesser amount of tumor cells was left behind, and recurrence was inevitable. At the present time these tumors, almost without exception, should be totally removed, with a mortality no greater than that of the incomplete operation, that is, slightly less than 10 per cent.

A much more comprehensive report of survival periods was published by Eisenhardt[3] in 1935 from the records of Cushing's complete series. Of about 2000 patients it appears that 499, or almost exactly 25 per cent, had survived from five to twenty-eight years following operation, but if one deducts the immediate operative deaths (approximately 400), the figure for the remainder is 31 per cent. This survey, like those of van Wagenen and Cairns, included all tumors, benign and malignant, but did not deal with the question of useful survival; therefore this feature and its relation to the favorable types of tumor cannot be estimated from the data available.

It is evident from the contents of the articles just quoted that the vast majority of patients surviving five or more years were those who harbored favorable tumors. It has been my purpose, therefore, in the present discussion, to look up the number and percentage of these favorable tumors in my own series, to tell what has been done for them

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 27, 1940.
From the neurosurgical departments of the Lahey Clinic, New England Deaconess Hospital and New England Baptist Hospital.

†Neurosurgeon, Lahey Clinic.

and to gain as clear an idea as possible of their survival and state of usefulness, since after all it is only useful survival that should be the aim of any form of therapy. Furthermore, it is only by going over one's material, following the patients for many years, and putting the facts on paper, that the profession and the public can be made to realize that there is an entirely hopeful side to the surgery of brain tumors and that a large percentage of patients can be and are completely cured.

The material on which the present study is based consists in the hospital records and follow-up reports (by personal interview or letter) of 400 consecutive patients with brain tumors that were verified pathologically from November, 1932, to June, 1939. Of this total number I have classed 224, or 56 per cent, as favorable tumors. By the term "favorable" as here used is meant tumors that were capable of complete and permanent removal, resulting in cure of the patients. This does

FIGURE 1. *Localized Thinning and Increased Vascularity at the Site of a Meningioma near the Vertex.*

not, of course, imply that all the 224 patients had their tumors removed and were cured. In a few cases the technical or other difficulties apparently prevented complete removal, and there was obviously an inescapable operative mortality, which will be given. What I wish to make clear, however, is that in going over the records of all these 400 patients carefully it is apparent that well over 50 per cent harbored tumors that were, or should have been, totally extirpated. Among the 224 favorable tumors there were 27 operative deaths, a mortality of 12 per cent. This leaves 197 survivors, but of these, 10 have died subsequently,

FIGURE 2. *Calcification in a Parieto-occipital Meningioma.*

leaving a final figure of 187 patients who are living and whose tumors I believe to have been wholly eradicated.

Coming now to the pathological types of favorable tumors, one finds that the 224 may be classed as follows: meningiomas, 80; acoustic neuromas, 33; pituitary adenomas, 30; gliomas (mostly cystic), 29; miscellaneous, 52. A note of explanation is due the miscellaneous group. Rather than give a long list of comparatively infrequent tumors, it has seemed best for the present purpose to put together in this category the remaining favorable growths, including certain angiomas, hemangiomatous cysts, colloid cysts of the third ventricle, certain craniopharyngiomas and pinealomas, cholesteatomas and unclassified tumors.

A brief word may now be said about the diagnosis of and the operations on these favorable tumors. The meningiomas, as might be expected, head the list. They are the solid encapsulated growths, usually occurring over the cerebral con-

vexities and often arising from or invading one of the major venous sinuses. Sometimes, however, they are found nestling between the optic nerves, or growing to huge size under both frontal lobes. Frequently they give recognizable changes in the skull by x-ray — increased localized vascularity, bony thickening or spiculization, enostoses, calcification or what appears to be a large osteoma overlying an intracranial tumor (Figs. 1 and 2). Although all the tissues surrounding meningiomas are highly vascular, which makes their removal at times extremely difficult, in almost every case they are capable of complete extirpation if one has a thoroughly trained team of co-workers. At times it is essential to remove many centimeters of the longitudinal or lateral sinuses, and large areas of skull that have been invaded by tumor.

When the meningioma is attached to the dura over one of the cerebral convexities, the dura is incised around the growth, blood vessels between it and the surrounding cortex are ligated either by electrocoagulation or silver clips, and by working around the tumor in this way it can gradually be tilted out from its bed and thus completely extirpated (Fig. 3). The large growths arising from the olfactory groove and extending under both frontal lobes must be attacked in a different way. Usually the anterior part of the right frontal lobe is excised, thus exposing the upper pole of the tumor. The contents of the tumor capsule can then be removed piecemeal by the electrosurgical loop, and finally the capsule of growth pulled away from the overlying brain and underlying optic nerves.

Acoustic neuromas are the second type of favorable growths. These are the well-recognized cerebellopontile-angle tumors, perfectly benign and completely encapsulated. Almost always they may be diagnosed from the clinical picture: tinnitus and increasing deafness on one side, followed by numbness of the same side of the face, staggering, headaches and in the later stages failing vision due to choked disks. Until recent years the common practice was to do an intracapsular extirpation of these tumors, but with this operation, although the result in some cases was good for several years, the growth always recurred and secondary operations were either unsatisfactory or carried a high mortality. I therefore always remove the tumor completely at the primary operation, and find that the mortality is no higher than that for the incomplete operation, namely, a little under 10 per cent. The one disagreeable feature of complete removal of these tumors is the resulting inevitable facial paralysis. This, however, can be overcome largely by a spinofacial anastomosis (Fig. 4). The operation as now done consists in a unilateral exposure of the affected cerebellar hemisphere, excision of the outer third of the lobe, intracapsular extirpation of the tumor

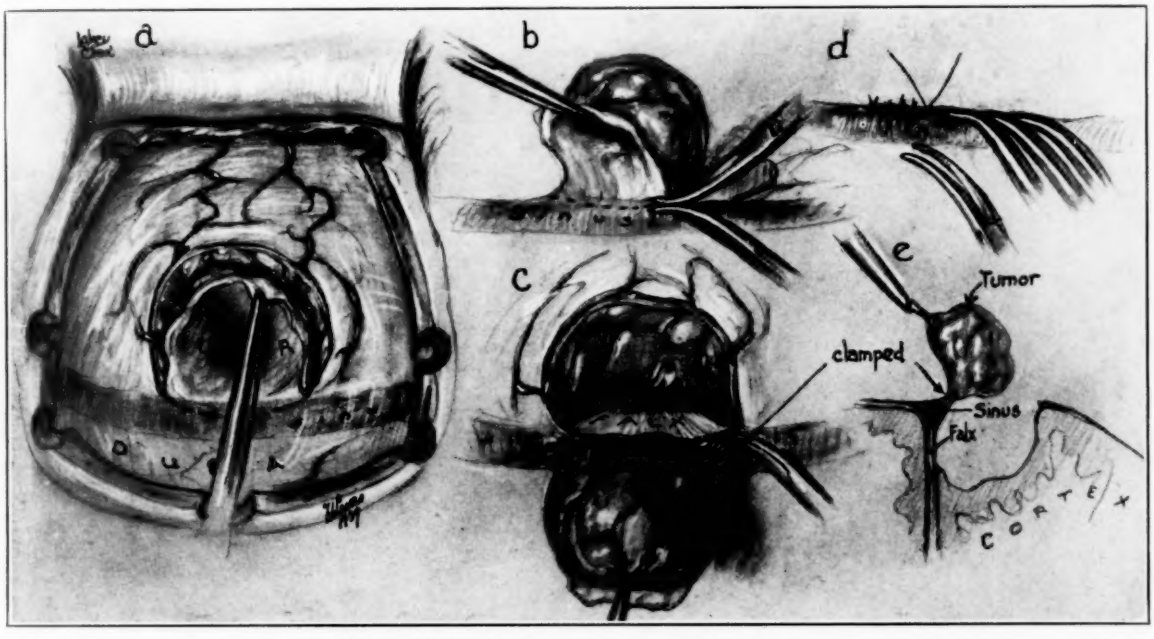

FIGURE 3. *Extirpation of a Surface Meningioma.*

(a) *Dural incision around the tumor, attached to the longitudinal sinus.* (b), (c) *Tumor being tilted out.* (d) *Sinus ligated with silk after placement of clamps.* (e) *Cross-section relations. (Horrax[4]: reproduced by permission of the publisher.)*

and, finally, withdrawal of the capsule by careful and painstaking separation from the pons, the trigeminal nerve and the blood vessels in the area (Figs. 5 and 6).

The third group of favorable tumors is that of the pituitary adenomas. They may be diagnosed by the familiar triad — optic-nerve atrophy, partial or complete bitemporal hemianopsia and an enlarged sella turcica, discernible by x-ray study (Fig. 7). Much has been written of late years concerning the role of x-ray treatment for these growths. It is true that a certain number of patients, probably under 25 per cent, will get a recession of their visual symptoms, at least for a while, by means of x-ray therapy, and for those whose vision is not already seriously affected I should advocate a trial by radiation. Patients must be followed carefully for a considerable time, since vision may fail insidiously and subsequent x-ray treatment may not be helpful. I have had many unfortunate patients who had tried this form of treatment, were helped for a while and then were not urged to seek further relief until vision was well-nigh gone and their tumors so extensive that they were inoperable. Operations for pituitary adenomas in the stage in which they should be operated on should not carry a mortality of over 5 per cent. The growth is approached by a frontal bone flap from an incision concealed within the hair line. The contents of the tumor capsule are evacuated, after which the capsule is removed down to the clinoid processes (Fig. 8). There is some tendency for pituitary adenomas to recur, but if so they may be reoperated on with little, if any, added risk.

Benign gliomas (usually cystic astrocytomas) are the fourth group of favorable tumors. They may occur in the cerebral hemispheres, but are commoner in the cerebellum and most frequent in children. The story is often one of intermittent bouts of headache and vomiting. Neurologically, cerebellar signs and symptoms are as a rule outspoken. Whenever found, the cystic portion of the tumor is evacuated, and the solid portion completely extirpated by electrosurgical methods (Fig. 9). After this, it is never necessary to remove the cyst wall or to fix it with hardening or sclerosing solutions.

FIGURE 4. *Partially Corrected Facial Paralysis by Spinofacial Anastomosis following Complete Extirpation of an Acoustic Tumor.*

In the miscellaneous group of tumors, attention should be called to a few of the outstanding points. Hemangiomatous cysts of the cerebellum occur in adults and give the usual cerebellar symptomatology, together with pressure signs. Just as in astrocytomatous cysts, the cavity is evacuated and the mural nodule — usually bright-red — is excised. The angiomas are dealt with almost entirely by electrocoagulation and occasionally by subsequent x-ray therapy. Colloid cysts of the

third ventricle are uncommon, but are small tumors about the size of a cherry, situated at the foramen of Monro. They give no localizing signs and are always diagnosed by ventriculography. They are removed after exposure of the foramen by a cortical incision down to the dilated ventricle. The favorable craniopharyngiomas (cysts of Rathke's pouch) are approached and removed by the usual frontal craniotomy employed for pituitary adenomas. Many tumors of this type are

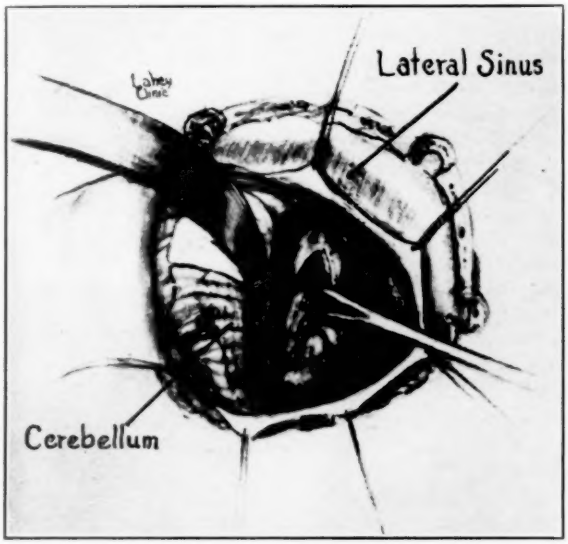

FIGURE 5. *Preliminary Excavation of an Acoustic Neuroma after Excision of the Outer Third of the Cerebellar Hemisphere. (Horrax and Poppen[5]: reproduced by permission of the publisher.)*

extremely extensive and adherent to important basilar nerves and arteries and therefore are not included in the favorable list. A few pinealomas are capable of complete extirpation by radical operative exposure, and I have two patients with these tumors who have survived three and seven years respectively. Cholesteatomas (pearly tumors) are rare but almost always favorable.

As stated previously, this study concerns the present status of 224 patients who were considered to have favorable brain tumors out of a total series of 400 verified tumors of all types. Deducting the postoperative and subsequent deaths, there have so far been 187 survivors. Since the operations on these patients dated from November, 1932, to June, 1939, it is obvious that the follow-up record varies from slightly over one to nearly eight years. It is fully realized that a greater time interval would have given a much more accurate picture, but the figures here presented are offered for what they are worth.

In going over the follow-up data of the 187 survivors, it is obvious that 27 have major disabilities or handicaps that prevent them from living useful lives.* Among the meningiomas, partial motor paralyses and convulsions are the outstanding features. Patients who have had acoustic tumors show residual ataxia, in a few cases sufficient to keep them from work. Three of the acoustic patients had become blind before they presented themselves for operation, and blindness from such secondary atrophy is almost never capable of any useful return of vision, even though intracranial pressure is entirely reduced. Blindness, however, is even more prevalent among the pituitary adenomas. This means that the tumors had almost certainly been present for many years before the malady was diagnosed, or else, as mentioned previously, x-ray treatment had been continued for too long a time without adequate checking up. But whatever the cause of disability, by far the

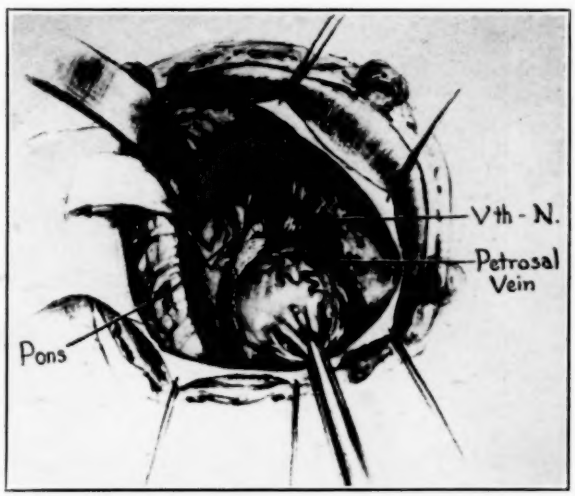

FIGURE 6. *Extraction of the Remaining Acoustic Tumor Capsule after Separation from the Trigeminal Nerve and Other Neighboring Structures. (Horrax and Poppen[5]: reproduced by permission of the publisher.)*

greater portion of them could have been prevented by an earlier diagnosis and an earlier removal of the tumor.

Going back to the 187 surviving patients, therefore, and deducting the 27 who have severe disabilities, one obtains a final total of 160, or 71 per cent of the original 224 with favorable tumors, who not only have survived but are leading useful lives with little or no functional loss.

605 Commonwealth Avenue

*One patient, although completely blind, has not been included in this list because he has carried on an important executive job ever since his operation, in spite of visual loss.

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Discussion

Dr. William J. Mixter, Boston: Dr. Horrax has given us a very valuable résumé of his cases of brain tumor. His results are better than the published results of many other clinics.

A person discussing a paper should stick to the paper and should not bring up some new topic; nevertheless, I am going to branch out somewhat. Dr. Horrax said little about the cystic hemangiomas. He stated that as a rule they are favorable cases, easily missed and rather difficult to handle. That is true. The patients frequently come to us without a diagnosis, and we often miss the diagnosis ourselves. Mistakes would be less frequent if careful examination of the whole of the fundus were the rule, particularly in cases of tumor of the cerebellum. Hemangioma of the retina is often associated with hemangiomatous cyst of the cerebellum.

Dr. Horrax spoke of the higher mortality in cases of malignant tumor. That has been our experience also. It is the malignant glioma that has given brain surgery more or less of a bad name.

I believe that one of the advances that will come in the surgery of brain tumor will be our ability to recognize these malignant cases without turning down an osteoplastic flap. Should we be able to achieve this, we shall be in a position to eliminate exploratory operations in many of these unsatisfactory cases.

Dr. Elliott C. Cutler, Boston: I should like to ask Dr. Horrax whether the nodule in the so-called "fibrillary astrocytoma" is the basis for the output of the fluid in the cysts. It is difficult to comprehend how glial cells can secrete fluid. I have long thought that the fluid must come from the capillary bed in the mural nodule and not from cells of the nervous system. I wonder whether on careful study the mural nodules of fibrillary astrocytomas show some relation to the capillary hemangiomatous type that Dr. Mixter has spoken about, and whether Dr. Horrax considers the fibrillary astrocytomatous cysts to be burned-out or partly burned-out hemangiomas.

Figure 7. *Typical Ballooned-Out Sella of a Pituitary Adenoma, with Erosion of the Posterior Clinoid Processes.*

Dr. Donald Munro, Boston: Dr. Horrax's presentation and figures are most encouraging. I do not know when I have heard any set of figures that stimulated me more. It is wonderful to have such an encouraging report come out about brain tumors, and I am sure all of you who see an occasional brain tumor realize that such encouragement is long overdue.

I should like, however, to present another point of view — that of the surgeon who sees brain tumors in the course of all the varied mixture of cases that comes into a non-specialized clinic. I do not see many patients with brain tumors; they usually have other diseases of the central nervous system. Those that I do get are liable to have been neglected or to have been undiagnosed for a long time; I should accordingly like to emphasize a point that I know Dr. Horrax believes in but did not have time to speak of and that is based on my experience with this particular group of tumors.

I have had 142 verified tumors. Fifty-nine per cent were gliomas. I have not classified them into favorable and unfavorable types, but that is a higher percentage than one would expect in a more segregated group of tumors.

A recent study has demonstrated that if any glioma includes a type of tissue that is blastomatous, the patient's life expectancy is only a year. That is well known, but what has not been so well recognized and brought out so clearly before is that, mixed with the unfavorable type of cell, there may be a very favorable type, and unless a great amount of tissue is provided for the pathologist to examine, a favorable prognosis may be given, whereas in fact the tumor is an unfavorable type of tumor.

This leads me to the first point to be emphasized; namely, that it is, in my opinion, impossible to make an adequate prognostic diagnosis of any given brain tumor unless that tumor is exposed at operation.

Another important thing, and another reason for exposing all brain tumors or suspected brain tumors, is that the ultimate end result of many of these cases depends, in part at least, on the situation of the tumor. Many favorable types of tumors have a bad prognosis because

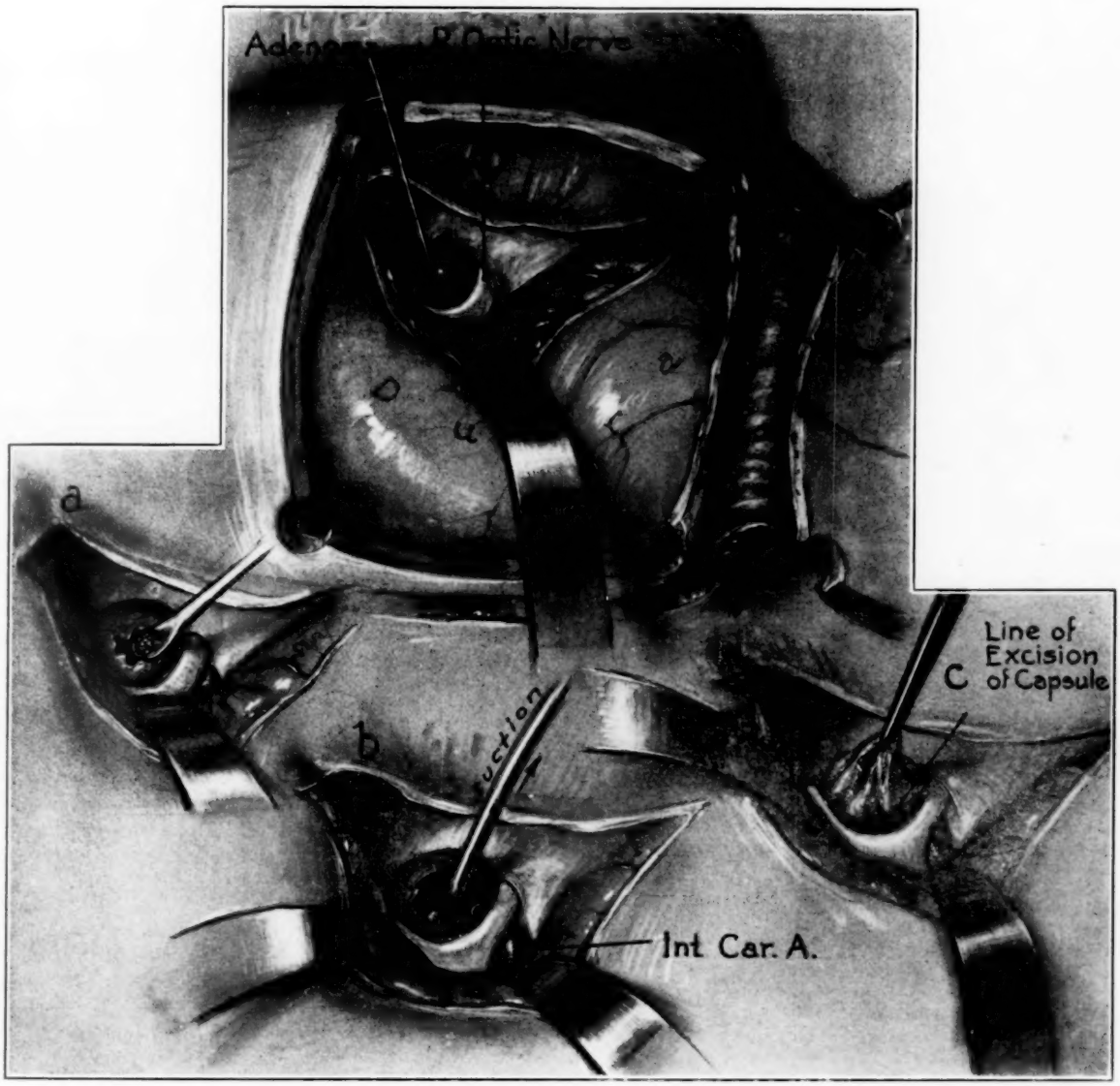

FIGURE 8. *Stages in the Operation for Removal of a Pituitary Adenoma.*

Through a right frontal bone flap, the dura is retracted and incised, exposing the tumor between the optic nerves. The contents are removed by spoons and suction. The capsule is excised down to the sella. (Horrax[6]: reproduced by permission of the publisher.)

they are so situated that they cannot be removed without producing death or a very bad invalidism from paralysis; therefore, what I should like to emphasize, and what I am sure Dr. Horrax would have emphasized had he had time, is that if a patient is suspected of having a brain tumor, particularly when there is any suggestion of localization, one should not neglect to provide that patient

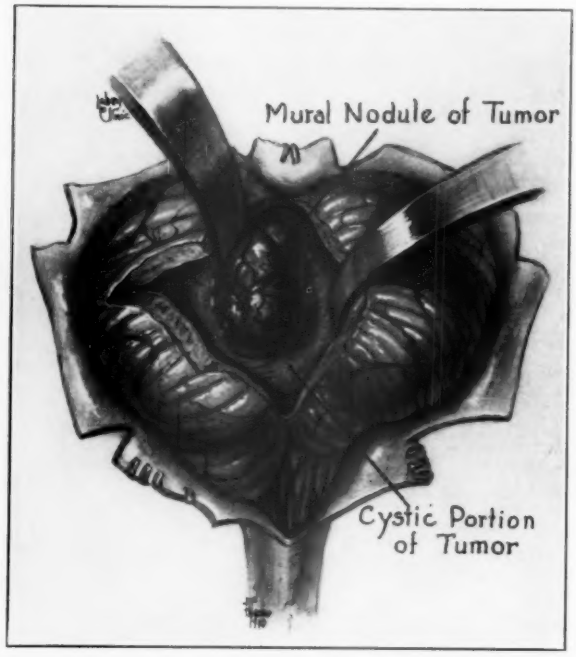

FIGURE 9. *Cystic Astrocytoma of the Cerebellum, Showing the Solid Portion of the Tumor in the Cyst Wall.*

with the ultimate in diagnostic means; that is, all such patients should be explored early and thoroughly. If the tumor is found, large amounts of the tissue should be taken out so that the pathologist can, in his turn, give a thoroughly accurate and adequate estimate of the prognosis. Only then has one the right to tell the patient that he is going to be well, or that he is going to die in any given time. Unless one has that specialized information, one is as liable to be wrong as to be right about this vital point.

DR. THOMAS H. LANMAN, Boston: I am speaking for Dr. Franc Ingraham, of the Neurological Service at the Children's Hospital. He has been very anxious to bring out one point with which he has been greatly impressed in dealing with brain tumors in children.

Dr. Horrax has mentioned the favorable nature of astrocytomas. Dr. Ingraham has found that these constitute a rather high percentage of the tumors found in children. He believes very strongly that the diagnosis between astrocytoma and medulloblastoma cannot be established without exposing the tumor. He is therefore convinced that exploration should always be done, and that radiation without a previous accurate diagnosis will result, and has resulted, in dangerous delay. The patient with astrocytoma has a fairly good prognosis after surgical removal of the growth.

DR. HORRAX (closing): In regard to Dr. Cutler's question concerning the cells and their secretion in the astrocytomatous cysts, I have not made a special study of this problem. The tumors grossly are usually so different that it would lead me to suspect that they must be somewhat different in their histologic aspects, though doubtless all have the same function of producing fluid. I assume that the fluid must come from some product generated in the cells, rather than that it is an influx from the cerebrospinal fluid, because the cerebrospinal spaces do not connect with the cysts. Many hemangiomatous cysts, but not all, have a bright-red nodule. An astrocytomatous cyst has a brownish and almost always a much larger nodule, but I have not studied the histology of the cells from the standpoint of secretory activity, so that I cannot say whether they are alike in this respect. They are both very favorable and not infrequent lesions, however.

Dr. Mixter's prophecy in regard to the ability to diagnose malignant tumors will undoubtedly come true, but we certainly have not reached that stage yet. Many people are doing various types of study to see if they can diagnose malignant tumors, and differentiate a glioblastoma from some of the more benign types, but not until we have reached that stage can we dispense with exploring, as Dr. Munro has said. I think, as Dr. Cushing did, that one must also do a very radical operation; in fact, I always try to take out all the tumor tissue possible, because, as Dr. Mixter and Dr. Munro have emphasized, many tumors will be of the mixed type and may have a prognosis of three, four, five or even ten years of perfectly good health before the symptoms recur.

I agree with Dr. Ingraham about the astrocytomas and medulloblastomas. The latter do respond to x-ray treatment, but there is no sure way of diagnosing them beforehand. When one has made a diagnosis of a tumor in a child, what to do is another question. One can take out some of it or remove as much as possible, but it is very difficult, at least in our hands, always to be sure preoperatively whether one is dealing with an astrocytoma or a medulloblastoma.

TUBERCULOSIS OF THE CECUM*

RALPH ADAMS, M.D.,† AND LANGDON J. PARSONS, M.D.‡

BOSTON

TUBERCULOSIS of the cecum is an uncommon disease in the wards of the Massachusetts General Hospital, where 79 cases of intra-abdominal tuberculosis have been diagnosed from 1924 to 1939. Thirty-eight of these are eligible for classification as tuberculosis of the cecum.

Attention was drawn to a consideration of this disease because the treatment of tuberculosis of the cecum in general hospitals seems to be poorly standardized. The question of whether surgical approach to the disease has any advantage over prolonged rest and supportive treatment, as in the pulmonary form, appears debatable. Naturally, the surgeon accepting a patient will be guided in his technical procedures by the extent and nature of disease encountered, but there is little agreement as to the best method to follow in a favorable case.

The usual history was one of infrequent colicky pain without radiation, centered around the umbilicus or localized in the right lower quadrant. The pain was associated with varying degrees of distention and was often relieved by pressure over the abdomen and by the passage of flatus or bowel movement. It seemed to have little relation to meals. Frequently there was a vague sense of discomfort in the right lower quadrant. As the symptoms became more frequent and severe, the pain was associated with vomiting. The severity of the pain and vomiting depended, in large measure, on the degree of obstruction. Increasing constipation, with failure to obtain relief by catharsis, and an increasing reliance on enemas were natural sequelae. Blood or mucus was or was not found in the stools, depending on the type of tuberculous process. The ulcerative form was less common than the hyperplastic in the older patients, and this fact probably explains the infrequency of melena in this age group. The changes observed in bowel habits tended toward diarrhea in the younger patients and almost invariably toward constipation in the older ones. All these symptoms were in the nature of obstructive episodes of gradually increasing severity. This is shown by the duration of illness, which began, for the most part, from six months to one year preceding admission. Rarely were the symptoms acute.

A train of generalized systemic complaints accompanied the localized obstructive symptoms. Ninety per cent of the cases had lost from 15 to 45 pounds within a year. The appetite was but little disturbed. Half the patients had symptoms referable to the lungs, although in several cases with no symptomatic evidence of pulmonary tuberculosis disease in the cecum had reached an advanced stage. All the patients who complained of thoracic symptoms were found to have advanced pulmonary tuberculosis. Contrary to expectation, only 19 of the 38 patients had physical signs of disease in the lung. This was of long duration in most cases, was readily noted on physical examination and was confirmed by x-ray examination.

An irregular mass with tenderness and spasm was observed in half the cases. It was characteristically extensive and fixed to the right lateral abdominal wall. Slight elevation of temperature (99.5 to 101.0°F.), with a correspondingly elevated pulse, was a common finding. The degree of emaciation depended on the extent of disease. The abdomen was distended in 7 cases, in each of which the patient had a mass in the right lower quadrant.

In contrast to the usual observations in other right-sided colonic lesions, notably carcinoma, only slight pallor and anemia were noted, despite the degree of emaciation. The red-cell count was never below 3,800,000, even in the advanced cases, and the hemoglobin reading was rarely below 70 per cent. A slight leukocytosis, from 13,000 to 15,000, with a rise in polymorphonuclear cells to 80 per cent, was commonly observed, as was an increase in the mononuclear cells to around 10 per cent. A positive guaiac test in the stools was not very helpful, for although 44 per cent of the cases were far advanced, positive examinations were reported in only 4 cases. Tubercle bacilli were demonstrated in the sputums of 13 cases.

The radiologists frequently observed spasm of the cecum to the point of incomplete filling, associated with a fixed, rigid, irregular and deformed ascending colon in many cases. These findings are often referred to as the "Steirlin defect." Attempts to confirm the findings of barium enema by a gastrointestinal series usually failed to provide additional information. A correct diagnosis was not made in 2 cases on the first admission because the gastrointestinal series was negative and a barium enema was not given. The commonest error in x-ray interpretation was to confuse the

*From the surgical services of the Massachusetts General Hospital.

†Assistant in surgery, Harvard Medical School; assistant in surgery, Massachusetts General Hospital.

‡Assistant in surgery, Harvard Medical School; assistant surgeon, Massachusetts General Hospital.

lesion with carcinoma of the cecum. The failure to find positive evidence of tuberculosis, either on physical examination or by fluoroscopy of the chest, contributed to the faulty diagnoses. A characteristic x-ray report reads as follows: "Tuberculosis unlikely because of negative chest findings." One third of the patients over thirty-five years of age, and nearly half the patients, had the disease in the absence of clinical or x-ray evidence of pulmonary disease.

Cases Operated On

Seventeen patients were subjected to a laparotomy. These cases were of the greatest help in determining the proper course of future treatment.

Exploratory Laparotomy

Four patients had only an exploratory laparotomy, with the added excision of a mesenteric lymph node for biopsy in 2 cases.

Case 1. A 25-year-old woman was found to have tuberculous colitis in addition to cecal involvement. The appendix had been removed at another hospital, and a microscopic diagnosis of tuberculosis was available. The evidence was thought insufficient for resecting the cecum, since rectal bleeding, from which the patient suffered, might be arising from a lower point in the colon. Only a calcified gland was removed. She made a good convalescence and recovered on a regimen of rest.

Case 2. A 28-year-old man was explored, with a preoperative diagnosis of acute appendicitis. A thickened, inflamed cecum was found, adherent to the right lower abdominal wall. The appendix could not be found and hence was not removed. A necrotic mesenteric node was excised for biopsy. The patient made an uneventful recovery.

Case 3. A 45-year-old man was operated on following a diagnosis of appendiceal abscess. Tuberculosis was recognized as the cause of the cecal mass. The appendix was not removed. One year later, after following a hygienic regimen for several months, he was well and working.

Case 4. A 39-year-old woman was an excellent subject for study, because progress of the disease was visualized at successive operations. Active tuberculosis of the intestines, with adhesions around the cecum, was seen at the first operation, done for a pelvic disorder. Inactive lesions were seen at a second laparotomy on the pelvic viscera. The patient is well and working.

It should be noted that no untoward effects followed the removal of mesenteric nodes in either Case 1 or Case 2. Cases 2, 3 and 4 illustrate the wisdom of noninterference. The appendix was not molested, and no sinuses developed. The patients recovered on a sanatorium regimen and are now arrested cases. Case 3 particularly emphasizes the courage required to withhold appendectomy, and the successful result that ensued.

Ileostomy

Three cases had an ileostomy only. Each had extensive intestinal disease, with mechanical obstruction in the right lower quadrant. Two were relieved of their obstruction but died of progressive tuberculosis. The third patient was dramatically relieved of pain, distention and diarrhea but died of a pulmonary embolus on the sixteenth postoperative day. These 3 cases were beyond the reach of hopeful therapy. They do illustrate the relief and comfort that may come from palliative operations on even badly ulcerated, tuberculous bowel. The principle is, of course, the same as that sometimes applied in ulcerative colitis. Ileostomy should be reserved for extensive cases with obstruction or profound irritative symptoms, when active disease in the lower bowel makes anastomosis doomed to failure.

Anastomosis Only

Three patients had a sidetracking anastomosis, 2 in addition to appendectomy.

Case 8. A 33-year-old man first had drainage of an appendiceal abscess. Three months later, he was readmitted with a fecal fistula and a mass in the right lower quadrant. There was advancing right apical pulmonary disease, and a spastic, nonfilling, deformed cecum was demonstrated by x-ray examination. Palpable involvement of the bowel extended to the mid-transverse colon at the second operation. The process was too extensive for resection. An ileosigmoidostomy was done. The sinus continued draining, and the patient was sent to a sanatorium. No new sinuses developed, but he died several months later of tuberculosis.

Case 9. A 28-year-old woman was explored for subacute appendicitis. A mass surrounded the cecum. The appendix was removed, and the stump buried. An ileotransverse colostomy was done. A sinus developed from the tip of the cecum within 3 months. This sinus healed on sanatorium treatment within a year, and the patient was discharged as an arrested case, 18 months after the onset of disease.

Case 10. A 60-year-old woman with far-advanced disease had an ileocolostomy but died 5 weeks later of debility and retroperitoneal sepsis. Post-mortem examination showed tuberculous colitis and ileitis, and retroperitoneal abscess. Clinically, the patient had been thought to suffer from carcinoma of the cecum.

The error in Case 8 was in expecting an actively infected bowel to heal. The second operation probably can be regarded only as an additional burden on an already overtaxed patient. Case 9 was one with relatively quiescent disease. The anastomosis was done between nondiseased loops of bowel and remained secure. An ideal situation existed for general rest in a sanatorium and for local rest of the diseased part by the sidetracking anastomosis, and the sinus that developed from the active focus in the cecum closed quickly. A sidetracking anastomosis probably offers the best hope of arrest in such a case, characterized by an obstructive mass and persistent localized activity. The anastomosis should be done between unin-

volved portions. Suture lines in the involved bowel frequently leak and are followed by sinus formation. An opening into the actively diseased cecum also invites sinus formation. Appendectomy increases the likelihood of this complication.

Resection

Resection and anastomosis were done in 7 cases.

Case 11. A 55-year-old carpenter entered the hospital with cramplike lower-quadrant pain, and increasing constipation of one year's duration. There was a tender 6-cm. mass in the right lower quadrant. A barium enema showed a constant filling defect in the cecum. The resected mass contained tuberculous pus. The patient had a good immediate convalescence and was lost from follow-up. Probably he died from his active pulmonary tuberculosis with cavitation.

Case 12. A 38-year-old unemployed Chinese entered the hospital in 1931, complaining of recurrent crampy abdominal pain and a loss of weight of 30 pounds within a year. A firm, tender, irregular mass filled the right lower quadrant. The chest was normal on physical and x-ray examination. A spastic cecum surrounded by a mass was demonstrated by barium enema. There was a 7.5-cm. area of constriction in the proximal transverse colon. Tuberculosis was thought unlikely because the chest plate was negative. Two operations for incision and drainage of a pericecal abscess were done prior to the main operation, which consisted of resection of the terminal ileum, ascending colon and first portion of the transverse colon. A lateral anastomosis was done. These operations revealed the abdomen to be free of disease except for the right lower quadrant and the right iliac fossa, where a posterior perforation had occurred from the cecal mass. The terminal ileum was infiltrated and thickened. Pathological examination revealed tuberculous ulceration of the cecum, ascending colon, and the distal 5 cm. of the ileum. The patient made a good recovery and is now well and working.

The diagnosis before and after operation in Cases 11 and 12 was thought to be carcinoma of the cecum. Involvement of the ileum should have suggested tuberculosis to the surgeon. The fact that the remainder of the abdomen was free of disease, however, made the diagnosis of tuberculosis unlikely. Undoubtedly, it is better to resect an active tuberculous cecum occasionally than to leave in place a carcinomatous cecum that is favorable for resection and cure.

Case 13. A 58-year-old housewife was admitted in 1935, complaining of two attacks of cramplike abdominal pain within a year. There was a tender fixed mass in the right lower quadrant. A chest plate showed contracture of both apices consistent with inactive tuberculosis. A barium enema suggested ileocecal tuberculosis, because of widespread mucosal destruction and scarring of the cecum and the ileocecal valve. Scirrhous carcinoma also was suggested because lack of spasm and lack of ileal involvement made the diagnosis of tuberculosis uncertain. Absence of change in bowel habits and freedom from blood favored tuberculosis as against carcinoma of the cecum. The surgeon's opinion was confirmed by pathological examination, which showed ulcerative and hyperplastic tuberculosis of the ileum and the cecum. The patient is well and working.

Case 14. This patient, a 44-year-old housewife, gave a history of various isolated episodes of diarrhea for many years; she had lost 23 pounds after an increase in diarrhea 6 months previously. There was occasional blood streaking of the stools. There was tenderness in the right upper quadrant. Chest examination was negative, but x-ray examination of the chest was not made. The barium enema met definite obstruction just below the hepatic flexure and showed deformity and narrowing of the cecum and ileocecal valve. The rugae were obliterated.The findings were considered typical of cancer. Carcinoma of the cecum was the only diagnosis considered, until the resected specimen was examined histologically and tuberculosis was found. Extensive old abdominal adhesions were the only clue to the diagnosis at the time of operation. The appearance of the local lesion was entirely consistent with carcinoma. There were acute intestinal obstruction and abdominal abscess postoperatively. She has continued to have recurrent attacks of diarrhea, with mucus and occasional blood, since operation six years ago, and is unimproved. Presumably, chronic tuberculous colitis has continued to cause her symptoms.

Case 15. An 18-year-old boy was admitted complaining of abdominal cramps, malaise and anorexia of 6 months' duration. There were mucous diarrhea without blood and a loss of 25 pounds in weight. The chest was clear by physical examination, but on x-ray examination the hilar shadows were increased. The patient was emaciated. There were slight tenderness and spasm in the right lower quadrant. A barium enema showed spasm of the ileum and cecum. An abscess surrounded the cecum. The ileum was thickened and dilated. The walls of the cecum were red and granular, and there were two narrowed areas in the ascending colon. Right colectomy and ileotransverse colostomy were done. Pathological examination showed the bowel walls to be thickened, and the mucosa to be red, granular and superficially ulcerated. The diagnosis was established microscopically. The patient failed to close a postoperative cecal fistula during several months' rest in a sanatorium. He was discharged against advice with a fistula but with great improvement over his preoperative condition.

In Case 15, the boy improved postoperatively on a sanatorium regimen, it is true, but several factors suggest that operation might wisely have been postponed indefinitely, and that he might have done equally well on a medical regimen exclusively. The preoperative diagnosis was probable tuberculosis. The alternative diagnoses of appendicitis and carcinoma could be excluded with reasonable certainty on the clinical and x-ray data and because of a white-cell count of 10,000 and 70 per cent polymorphonuclear cells. The patient was emaciated and in poor condition for any elective operation. The likelihood of activity and poor results because of youth might have been considered more serious contraindications than they apparently were. The cecal fistula was an added burden. The improvement postoperatively is more likely due to the good sanatorium care that he received than to the operation.

Case 16. A 44-year-old American chemist was admitted in 1937, complaining of increasingly frequent attacks of abdominal pain accompanied by nausea, vomiting, and occasionally diarrhea, for five years. The episodes could be avoided by a regimen of mineral oil and liquid diet. He had had pulmonary tuberculosis 19 years previously, with a recurrence 13 years previously. He was undernourished. There was a movable, slightly tender mass in the right lower quadrant. A barium enema showed a filling defect in a shortened, scarred cecum. The terminal ileum was dilated but could not be filled with barium. A right colectomy was done. The convalescence was uneventful, and the patient is now well and working, 2 years after operation.

Case 17. A 55-year-old woman was well for 7 years following a right colectomy, anastomosis and sanatorium convalescence in 1926. The procedure was done for purely obstructive symptoms caused by inactive constricting tuberculosis and scarring of the cecum. Tuberculosis of the lung had existed fifteen years before admission to the hospital, with clinical arrest, and an x-ray plate of the chest showed healed tuberculosis at the right apex. Presumably, there was also tuberculous enteritis thirteen years previously. Poverty in 1933 caused undernutrition, and there have been recurrent periods of diarrhea and pain since that time. There is now a mass in the left upper quadrant, but debility and old age preclude consideration of further operative procedure.

The patients in Cases 16 and 17 represent the type that obtained most benefit from surgery. In contrast to the youth in Case 15, their tuberculosis was quiescent, the disease was localized and the symptoms were purely obstructive in origin. Consequently, a direct attack on the involved cecum was tolerated. In the peritoneal cavity, as in the lung, pleura or bone, surgical attack on active tuberculosis results usually in disappointment for the surgeon and grief for the patient. It seems futile to attempt extirpation of active disseminated colonic tuberculosis. In cases properly selected for resection, the suture lines have caused little trouble. No unusual principle is involved in selecting a site for anastomosis, beyond the choice of a bowel free from gross evidence of previous involvement.

In summary, then, of the 7 cases on which resection was done, 3 patients are well and working, 1 is improved, 1 was relieved for seven years, after which the disease recurred, 1 was unimproved and 1 presumably died of generalized tuberculosis.

Cases Not Operated On

Twenty-one patients remain on whom no operation was done. In 9 of these, advanced generalized tuberculosis — of which cecal disease comprised only one major part — precluded consideration of any operative procedure. All 9 are dead.

Ten patients had extensive disease in the cecum and frequently elsewhere, but a hygienic regimen was advised instead of operation after weighing the merits of each case. Three of this group of 10 grew steadily worse until death, and a fourth is near death from pulmonary tuberculosis. Three patients have had arrest of their disease but remain unemployed. Three patients are well and working. Two of these 3 deserve special mention because they had associated pulmonary disease requiring thoracoplasty. No operation was performed until a rigid sanatorium regimen had caused the intestinal lesions to become quiescent; the thoracoplasties were then done. The intestinal disease remained quiescent. Complete clinical recovery resulted in each case.

An operation on one focus of tuberculosis will often cause any active focus elsewhere in the body to become worse. Experience has proved that this relation is unusually close between the lungs and the intestinal tract. A patient with a single lesion should demonstrate ability to localize it, and a person with two lesions should demonstrate ability to arrest one of them before being considered for elective operation. That this conservatism on the part of thoracic surgeons is no idle fear is indicated by one of the cases mentioned above as arrested but unemployed, which began a fulminating ileocecal tuberculosis immediately after a second-stage thoracoplasty.

Two patients who were urged to have operation and refused further illustrate the reparative processes that may occur under favorable hygienic conditions.

Case 18. A 24-year-old man was seen in 1931 with diarrhea, periumbilical pain, night sweats, weakness and passage of mucus in the stools. The cecum and terminal ileum were spastic, poorly filling and tender. After two years of sanatorium care, the lesion could no longer be seen by x-ray examination. The patient did work as a cabinetmaker for one year, and the symptoms recurred. The disease again was shown by x-ray examination, and operation was advised. Again it was refused. A hygienic regimen was established. The patient was seen in 1934, 3 years later, when he was gaining weight and doing light work. A gastrointestinal series and a barium enema showed a deformed cecum but an apparently healed gastrointestinal tract. There was no pulmonary disease. He was last seen in 1939, eight years later, in "the best condition in many years."

Case 19. A 60-year-old woman complained of increasing distention, intermittent pain in the right lower quadrant, belching of gas and flatus for one year. The pain had become colicky in the few days preceding entry. There was a chronic cough of many years' duration. Subacute obstruction subsided on the ward. Investigation disclosed a collapsed right middle and right lower lobe. A barium enema showed an extensively deformed and scarred cecum, with a very narrow ileocecal lumen. The rest of the bowel looked normal. A proctoscopy was negative. The sputum was negative for acid-fast bacilli. There was no blood in the stools. The patient was strongly advised to have an operation for subacute intestinal ob-

struction, probably due to tuberculosis of the cecum. This she absolutely refused to consider. She has led a quiet life at home on a soft bland diet and has had no further gastrointestinal symptoms. She can eat anything she wishes. There is one bowel movement a day without mucus or blood.

Summary and Conclusions

The chief value of reviewing a small group of patients with tuberculosis of the cecum is that these cases represent the problem as seen in the community, inasmuch as they are drawn from the wards of a general surgical hospital. For example, it has long been an impression, gathered largely from reports of tuberculosis sanatoriums, that the absence of clinical or x-ray findings of pulmonary tuberculosis tends to rule out tuberculosis of the cecum, thereby contributing to the diagnosis of carcinoma of the cecum, with which it is most often confused. Yet 19 of the 38 cases reviewed in this series failed to show either clinical or x-ray evidence of tuberculosis in the lungs. Another point of interest in the differential diagnosis between carcinoma and tuberculosis may be found in the relatively normal blood picture, despite marked cachexia, commonly observed in tuberculosis, in decided contrast to the profound anemia often present in carcinoma of the ascending colon, even in its earlier stages.

Despite these observations and the fairly characteristic x-ray picture of tuberculosis of the cecum when spot films are employed, the differential diagnosis between tuberculosis and carcinoma cannot always be made. Exploration is, therefore, indicated. The problem, then, is in proper evaluation of the pathologic lesion, which in most cases is extensive. Involvement of the terminal ileum contributes to the diagnosis of tuberculosis. The commonest error is the failure to estimate adequately the degree of activity of the tuberculous process after carcinoma has been ruled out. Extensive surgery involving resection of the right colon, in the presence of active disease, encounters risk of failure. Temporizing procedures, such as appendectomy, frequently produce distressing fistulas. When sanatorium care has followed exploration alone, excellent results have been obtained. Surgical intervention is theoretically sound only to relieve acute obstruction or to remove obstructive sequelae of an arrested infection, and in practice the theory is fairly well substantiated. A sanatorium regimen should precede surgical intervention in practically every case, because tuberculous activity can be halted only by tissue resistance, and because rest is the best aid to healing.

VITAMIN C SURVEY IN DIABETES*

Louis B. Owens, M.D.,† Jackson Wright, M.D.‡ and Edna Brown, M.S.§

CINCINNATI

THE relation of vitamins to human nutrition has recently been widely studied, and the basic importance of certain vitamins in cellular metabolism has become evident. In a metabolic disease such as diabetes, there is a profound disturbance of carbohydrate storage and utilization, and the effect of vitamins may become particularly important. Possible vitamin B inadequacies in diabetic patients were discussed in a previous paper,[1] and the effects of administering various vitamin B fractions to well-controlled diabetic patients were reported. No evidence of inadequacies was found.

This paper reports a survey of the vitamin C status of 125 diabetic patients to determine how much vitamin C is actually eaten, and to see what relation exists between vitamin C and the severity of the disease.

Sebesta, Smith, Fernald and Marble[2] have recently published the results of a study of the vitamin C status of 49 diabetic patients who were observed at the New England Deaconess Hospital. Their results indicated an excellent state of vitamin C nutrition. Only 1 patient showed a fasting-blood ascorbic acid level below 0.40 mg. per 100 cc., 12 patients (24 per cent) showed levels between 0.40 and 0.80 mg., and the remaining 36 (74 per cent) had blood levels over 0.80 mg. On the five-hour-1000 mg. saturation test,[3] only 13 (26 per cent) showed an excretion under 400 mg. The authors suggested that the values were not representative because their patients were of the higher economic groups, and that the findings of a large public clinic might be quite different.

The Diabetic Clinic of the Cincinnati General

*From the Department of Internal Medicine and the Laboratory for Experimental Medicine, University of Cincinnati, and the Diabetic Clinic, Cincinnati General Hospital.

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†Instructor, Department of Internal Medicine, University of Cincinnati; director, diabetes clinic, Cincinnati General Hospital.

‡Research fellow in diabetes, Department of Internal Medicine, University of Cincinnati.

§Research assistant, Department of Internal Medicine and the Laboratory of Experimental Medicine, University of Cincinnati.

Hospital offers an unusual opportunity to study the vitamin C status of patients in low economic groups. It is entirely a charity clinic, supported by city and county funds; no patient who can afford the services of a private physician is admitted for treatment. Over 30 per cent of the patients are on direct relief, 20 per cent are supported by private industry, and the remainder are on WPA, old-age pension, veterans' benefit or some other form of charity.

Even though the food expenditure in our clinic averages only $2.10* a week, an attempt is made to design all diabetic diets so that they are adequate in protein, minerals and vitamins. We believe that any dietary lack, particularly with reference to the vitamins, is more a failure of co-operation or a lack of funds than an inherent fault of the diet. Diet classes are held weekly to acquaint diabetic patients with the benefits of raw fruits and vegetables, in the hope that whenever possible they will select foods high in vitamin content.

Method of Study

One hundred unselected "old" diabetic patients, who were being followed regularly in the clinic, were studied during a period extending from February to June, 1940, and 25 "new" patients with no previous treatment were also observed. Blood samples were taken either fasting or when, by special arrangement, no food containing vitamin C had been eaten for breakfast. The method of Farmer and Abt[4] was used for the blood ascorbic acid determination. The dye (2,6-di-chloro-phenol-indophenol) was refrigerated in a glass-stoppered brown bottle and was standardized against a known solution of Cebione† at intervals of two to three weeks.

Thirty-five cases were selected for an estimation of the vitamin C content of the diet. Patients were asked to keep a daily record of the type and amount of vegetables, fruit and meat eaten. The sizes of the portions were recorded in common household measures. The diets were first evaluated for *dependable* sources of vitamin C, such as citrous fruits, tomato juice and raw vegetables, and then for *uncertain* sources, such as cooked fruit and vegetables. The table compiled by Bessey[5] was used for estimating the vitamin C content of the various foods. The small amounts in milk and meat were disregarded. Dependable and uncertain sources were calculated separately and then divided by the number of days the diet was observed, so that the final figures represent the average daily intake from all sources.

Individual diets were prescribed for each patient, the daily intake ranging from 920 to 2300 calories. It is the policy of the clinic to prescribe an "average" amount of carbohydrate in diabetic diets. Fifty per cent of the patients were allowed a carbohydrate intake between 120 and 150 gm.; in 25 per cent it was over 150 gm. and in 25 per cent under 120. Only four diets had a carbohydrate intake under 100 gm., and only two were over 200.

Ophthalmoscopic examinations were made on all patients, with particular attention to the presence of lenticular opacities, the state of the vessels, hemorrhage, exudate, atrophy and pigmentation. When retinitis was suspected, an eye consultation was obtained. Clinical evidences of scurvy were sought by examination of the gums. Changes in the gums were thought to be significant if they seeped blood by moderate pressure with a throat stick, or if there was a history of repeated bleeding following the use of a toothbrush. If gums that bled easily were also spongy and hypertrophic, a capillary-resistance test was made by placing the blood-pressure cuff at 30 mm. and inflicting mild trauma in the antecubital space. When boils, open ulcers, carbuncles, incipient gangrene or osteomyelitis was present or had recently occurred, infection was considered significant.

So that adequate controls might be supplied, 50 nondiabetic patients were taken at random from the general medical clinic. No patient on a therapeutic diet was studied. The method of collecting the samples was the same as that for the diabetic patients.

Results

Results of the blood ascorbic acid determinations in diabetic patients and in the controls, and comparisons of levels in various groups are shown in Table 1.

The status of the 100 "old" diabetic patients was found to be considerably better than that of the controls, but was still far below optimal levels. Sixty-three per cent had fasting blood levels below 0.80 mg. per 100 cc., and 35 per cent had levels below 0.40 mg. It was believed that if diet instruction had not been given, the selection of food would have been no different from that of the controls, and that the blood ascorbic acid level would have been in the same low range as in this uninstructed group.

The blood ascorbic acid levels of "new" diabetic patients fell somewhat lower than those of the "old" diabetic patients, but were better than those of the controls. Seventy-six per cent were below

*The recent initiation of the food-stamp plan for Cincinnati relief clients, and the placing of citrous fruits and fresh vegetables on the surplus-commodity list, may considerably simplify the dietary problems of diabetic patients who are on relief.

†The Cebione used in this study was supplied through the courtesy of Merck and Company, Rahway, New Jersey.

0.80 mg. per 100 cc., and 48 per cent were below 0.40 mg. It was again believed that the factor of food selection influenced the results, and that the group as a whole would improve when adequate dietary instruction had been received.

One of the most striking findings in the whole study was the exceedingly low level of blood vitamin C found in the 50 nondiabetic patients. Ninety per cent were below the optimal level of 0.80 mg. per 100 cc., and 68 per cent were under the generally accepted critical level of 0.40 mg. The economic status of the nondiabetic patients was no better than that of the diabetic patients. Left to to interest the wives of our patients in the lectures on diet instruction.

There was no relation between blood ascorbic acid and age or race of the patients. Thirty-two per cent of the patients were over sixty years of age and showed about the same distribution of values as the whole group. The average for 67 white patients was practically the same as that of 33 colored patients.

Dietary Intake

Diet analysis has proved to be only a fair means of studying vitamin C nutrition. Although the reliability of the patient must be taken into consid-

TABLE 1. *Relation of Blood Ascorbic Acid Levels to Various Groups of Diabetic Patients.*

Group of Patients	Total No. of Cases	Blood Ascorbic Acid Levels: under 0.40 mg. per 100 cc.		0.40 to 0.80 mg. per 100 cc.		over 0.80 mg. per 100 cc.	
		No. of Cases	Per Cent	No. of Cases	Per Cent	No. of Cases	Per Cent
"Old" diabetic patients	100	35	35	28	28	37	37
"New" diabetic patients	25	12	48	7	28	6	24
Diabetic patients (all types)	125	37	38	35	28	43	24
Nondiabetic patients	50	34	68	11	22	5	10
"Old" male diabetic patients	38	18	49	8	22	12	29
"Old" female diabetic patients	62	17	28	20	32	25	40
"Old" colored diabetic patients	33	11	33	12	36	10	31
"Old" white diabetic patients	67	24	36	16	24	27	40
Diabetic patients over 60 years of age	32	8	25	13	41	11	34
Diabetic patients with diets under 1200 calories	12	4	33	4	33	4	33
Diabetic patients who have had diabetes for 5 yrs.	46	11	24	15	32	20	44
Diabetic patients with poor diabetic control	24	10	42	6	25	8	33
Diabetic patients with good diabetic control	42	13	31	16	38	13	31
Diabetic patients with a blood-sugar content over 250 mg. per 100 cc.	32	13	41	5	16	14	43
Diabetic patients on insulin	56	20	36	15	28	21	36
Diabetic patients with infections	21	6	28	7	32	8	38
Diabetic patients with retinitis	17	6	35	7	41	4	24
Diabetic patients with cataracts	34	7	20	11	32	16	48

their own selection on a limited allowance for diet, they chose cheap foods that happened to have a low vitamin C content. In spite of these low chemical findings, no cases of scurvy were found among the nondiabetic patients.

Influence of Various Factors on Blood Vitamin C Levels

Sex, Race and Age

The male diabetic patients had lower levels of blood ascorbic acid than the female patients. Analysis of the diet showed that the former consumed foods low in vitamin C (cooked vegetables and meats), whereas the latter were more inclined to eat foods that supplied a good source (salads, raw vegetables and fruit). Furthermore, the women were more likely to go home and prepare the food about which they had been instructed, but the men had to convey the diet instructions to their wives. In only a few cases have we been able

eration, there is also a marked variation in actual vitamin C content of foods as they reach the table. The season of year and the length of time that the food is cooked both alter the amount of available vitamin C. Of the 35 diet analyses made, only two thirds showed a direct relation between the intake of *dependable* amounts and the blood ascorbic acid. Among the remaining third, 6 patients reported diets with adequate amounts of vitamin C, but showed low blood ascorbic acid levels; 5 showed little or no dependable sources but still had reasonably normal blood levels. No relation at all could be found between *uncertain dietary* sources of vitamin C and the blood level.

If a diet is low in calories, it does not necessarily follow that it is low in vitamin C. Foods of high caloric content, avoided in reduction diets, usually have less vitamin C than foods of low caloric content. Vegetables, fruits and salads high in vitamin C are substituted for bread and fats that have a

lower content. Of 12 patients on reducing diets of 1200 calories or less, one third were found to have blood ascorbic acid levels under 0.40 mg. per 100 cc., and one third had levels over 0.80 mg. This was about the same distribution as that for diabetic patients who were not on reducing diets.

Duration and Severity of the Diabetes

It appears that the longer a patient has diabetes, the higher his ascorbic acid level becomes. Non-diabetic patients had lower ascorbic acid levels than "new" diabetic patients, and "new" patients lower levels than "old" diabetic patients. Forty-four per cent of the patients who had had diabetes for five years or longer were found to have levels of over 0.80 mg. per 100 cc.; only 24 per cent were under 0.40 mg. Seven out of 8 diabetic patients who had blood ascorbic acid levels over 1.30 mg. had been clinic patients for five years or longer. Diet instruction most probably accounts for these findings. The longer a patient has diabetes, the oftener he hears lectures on diet selection, and by dint of repetition, he learns to choose foods that, among other things, are high in vitamin C.

The state of diabetic control and the level of the blood sugar at the time the blood sample was taken had no relation to the blood ascorbic acid, nor did the administration of insulin in any type or amount have any effect on the vitamin C status of the patient.

It has been stated that there is an increased demand for vitamin C during infections,[6] and that a low vitamin C level of itself tends to delay wound healing.[7] To find any relation between the two, evidences of either recent or actual infections were sought. No significant relation was discovered; just as many patients in a good state of vitamin C nutrition had pyogenic processes as did those who had chemical scurvy.

Certain Eye Conditions

Bellows[8] has reported lower vitamin C levels in patients with cataract than in control patients of the same age groups and economic status. Furthermore, he has been able to produce cataracts in guinea pigs by feeding them diets low in vitamin C. The findings in our group of diabetic patients with cataracts failed to support such a contention; 48 per cent had blood vitamin C levels over 0.80 mg. per 100 cc. whereas only 20 per cent had levels below 0.40 mg. Some of the highest levels recorded were found in cataractous patients.

Patients with retinitis, either diabetic or arteriosclerotic, showed a slightly lower ascorbic acid level than the other diabetic patients observed. Among 125 patients, both "old" and "new," 17 cases of retinitis were found. Of these, only 24 per cent had a blood level over 0.40 mg. per 100 cc., compared with 34 per cent for the whole group. Although these findings are lower than the average figures, they are not different enough to be significant.

Bleeding, Infected and Scorbutic Gums

Over half the diabetic patients studied were edentulous. Among the remaining patients, bleeding gums were found oftener in those who had low levels of ascorbic acid. Forty-eight per cent of diabetic patients with ascorbic acid levels under 0.40 mg. per 100 cc., had bleeding gums, whereas only 26 per cent with levels over 0.80 mg. showed this sign. On the other hand, many patients in an excellent state of vitamin C nutrition had gums that bled easily, and normal gums were found in patients whose ascorbic acid levels were close to zero. Low vitamin C was therefore not considered an etiologic factor in the bleeding gums so frequently found in clinic patients.

The incidence of pyorrhea was approximately the same as that for bleeding gums. Although more cases were found among patients with blood ascorbic acid levels below 0.40 mg. per 100 cc., numerous cases were found among those with high levels.

Bleeding, hypertrophic gums suggesting scurvy were found in only 4 cases. One of these had an ascorbic acid level of 1.04 mg. per 100 cc. and showed excellent excretion when given a saturation test. The capillary-resistance test was negative, and since clinically there was only partial evidence, it was believed that the hypertrophic gums were on some basis other than vitamin C deficiency. Two cases had typical scorbutic gums and blood levels of ascorbic acid consistent with the diagnosis, but neither showed any decrease of capillary resistance. They were considered questionable cases of scurvy. The remaining case showed clinical signs of scurvy, and had chemical levels that supported the diagnosis. There was a rather low excretion of ascorbic acid on the saturation test, and a history of not having eaten citrous fruits for four or five months. Out of the 175 cases studied, this was the only one in which the diagnosis of scurvy was made.

Conclusions

If the clinic patients at the Cincinnati General Hospital are left to their own selection, they choose foods low in vitamin C. The cost of good vitamin C sources, such as citrous and fresh fruits, is higher than that for other carbohydrate sources, and in a clinic composed chiefly of charity pa-

tients, this factor is of considerable importance. An equally significant factor is the natural preference of this class of patients for foods like bread, dry beans and fat meat, in which the vitamin C content is low. It is impossible for these patients to increase food expenditure, but the matter of personal choice can be corrected by diet instruction. Diabetic patients who have come to the clinic regularly and have followed the diet instructions carefully have a more normal ascorbic acid level than new, uninstructed patients.

Although we believe that a normal intake of vitamin C is advantageous, we have discovered no concrete evidence that it has any effect on the state or severity of the diabetes. As many patients with a high level of ascorbic acid were taking insulin as those with a low level. Patients with adequate vitamin C nutrition had glycosuria and hyperglycemia just as frequently as those with inadequate nutrition, and low levels of ascorbic acid had no relation to the incidence of pyogenic processes.

Of considerable interest is the fact that almost half the patients observed had blood ascorbic acid levels under 0.40 mg. per 100 cc., yet only one case presented undisputed evidence of scurvy. One of two things must be at fault. Either there is a deficiency of some substance other than ascorbic acid in clinical scurvy, or we must revise the notion that the critical level for the appearance of scorbutic signs is 0.40 mg. per 100 cc. of ascorbic acid.

Summary

One hundred diabetic patients who had been under treatment and 25 untreated diabetic patients were studied with respect to vitamin C nutrition. All were clinic patients of low economic status. Two thirds of these patients had a blood ascorbic acid level under 0.80 mg. per 100 cc. Fifty non-diabetic patients were also studied, 90 per cent of whom had ascorbic acid below the prescurvy level (0.80 mg. per 100 cc.).

Dietary inadequacy, caused by lack of money and poor selection of foods, accounts for these low levels of ascorbic acid. The vitamin C status of diabetic patients is improved by diet instruction, even if the food expenditure is as low as $2.10 a week.

Men were found to have lower than average levels of vitamin C, and patients with cataract had a higher level. Low-calorie diets, insulin administration, hyperglycemia and glycosuria had no apparent relation to blood ascorbic acid content. Only one case of scurvy was found, even though 81 out of 175 patients had blood ascorbic acid levels under 0.40 mg. per 100 cc.

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POST-MORTEM EXAMINATION IN RURAL GENERAL PRACTICE*

WILLIAM F. PUTNAM, M.D.

LYME, NEW HAMPSHIRE

THIS report covers the results and significance of an attempt to establish as a routine procedure the performance of post-mortem examinations in a rural general practice, and is based on an analysis of the deaths occurring in the four years 1936 through 1939. Of 64 fatal cases, autopsies were performed on 34 (53 per cent); permission for autopsy was refused in 24 (38 per cent) and no permission was requested in 6 (9 per cent).

That the value of routine post-mortem examinations is little understood and appreciated by the lay public is well known. That the medical profession itself shares the apathy, if not the active antagonism, of laymen, must be inferred from the fact that the vast majority of deaths are not investigated by autopsy. In relatively few hospitals is the percentage of post-mortem examinations high enough so that the procedure can truthfully be called routine, and the number of examinations done on the bodies of those who have died outside hospitals is so small as to be negligible from a statistical standpoint.

The arguments that can be adduced for the routine performance of post-mortem examinations in hospitals apply with even greater force to the holding of such examinations in outside practice. Such examinations are the only conclusive means of ascertaining the cause of death, which is a matter of vital interest not only to all who try to draw conclusions from mortality statistics, but also to the family and physician interested in a particular patient. For the physician who has been taking care of a case, it is obviously more than interesting information, since the examination brings into sharp focus in proper relation, often for the first time, all the different stages and aspects of a disease. He is able to review the accuracy of his diagnostic procedures and the appropriateness and effectiveness of his therapy, thus making each fatal case highly instructive and very directly helpful in dealing with future similar cases. Furthermore, the knowledge that an autopsy will probably be held and the case reviewed by a department of pathology strongly encourages conducting a case in such a way that it will stand the light of analysis and discussion by others, and will be a stimulus to the making of complete records and exact and accurate diagnoses.

The impartial knife of the pathologist is a certain antidote for conceit. Without autopsies, the natural tendency is to develop a blind confidence in one's habitual methods, which tends to be strengthened by the mere passage of time. The physician who is practicing by himself in a more or less isolated community, with no large hospital and few if any colleagues at hand, can more easily and quickly than any other arrive at a point where he feels an unjustifiable degree of self-satisfaction. Most of his diagnoses appear to be correct, or at least nothing occurs to cast serious doubt on them, most of his patients recover following his ministrations, and most of the deaths appear to be inevitable. One who does not take advantage of the opportunities that would be provided by post-mortem examinations on his own cases to recognize and remedy his deficiencies is in danger of ultimately becoming a liability to the community. With unjustified confidence in himself, he is in a position to do a great deal of harm through repetition of unrecognized mistakes.

Such an intensive clinicopathological review of one's cases provides a most effective way for a physician to broaden his knowledge of pathology and medicine. Especially one who is not connected with a teaching hospital has relatively little stimulus or opportunity for study. Only with difficulty and at considerable expense can he pursue definite postgraduate courses. Therefore it is especially important that he make use of such opportunities as are at hand, and certainly routine post-mortem examinations on one's own cases afford the country doctor a unique educational opportunity that is highly profitable and usually available.

This practice would do much to eliminate the double, or really multiple, standard of medical practice that now exists. Fundamentally, there is no reason why patients should not expect and receive just as scientific and satisfactory diagnosis and treatment from the rural general practitioner as from his colleague in the large hospital. They never will while the former continues to bury his mistakes unexamined. Nothing will raise the standard of rural practice of medicine so effectually as routine post-mortem examinations, and

*One of the two essays awarded the Pray and Burnham Prizes for 1940 by the trustees of the New Hampshire Medical Society.

incidentally, nothing will eliminate the bogey of state medicine so effectively as better standards of practice under the present system.

Besides the benefit to the individual physician or the small group that may be concerned with a particular case, each post-mortem examination adds at least a fragment to the general science of pathology, and there is always the possibility of adding something of great importance.

It is, of course, essential in private as in hospital practice to obtain from a responsible relative a valid, written permission for the performance of an autopsy, and obviously this is the first step in doing such examinations. This is easy in many cases, and possible in most if the physician making the request uses a proper approach. He must first have a sincere and strong belief in the value of the procedure, and secondly he must successfully convey to his hearer an appreciation of that point of view. A straightforward, confident approach, conveying the impression that it is routine and to be taken for granted, is all that is usually needed, and disposes at the outset of the argument that autopsies are not customary. The majority of objections encountered are illogical and invalid, and may be overcome by skillfully presenting the case. The commonest of all is the fear of disfiguring the body. This may usually be overcome by drawing an analogy to surgical incisions and pointing out that the exterior of the body is restored to approximately its natural condition so that there is nothing to prevent the usual type of funeral after an autopsy. Many people state that they do not want the body "cut up." A careful choice of words in describing the procedure, in addition to clearly setting forth the arguments in favor of it, will often dispel this prejudice. It is, however, essential to make sure that the person interviewed has an approximately accurate conception of the nature of the procedure, for if permission is granted under the impression that incisions are not involved, the autopsy might result in a most unfortunate misunderstanding. In some cases it is possible to mention the fact that natural decay soon defaces the body, and that an autopsy retards the process, rather than otherwise. One often encounters the attitude that the patient is dead and that the procedure will consequently do him no good. This should be countered by pointing out the opportunity to do good to others suffering from a similar malady, and usually it is possible to say that the patient himself would undoubtedly wish to do what he could to help others similarly afflicted. The possibility of direct and immediate benefit can be brought closely home in cases of possibly hereditary or contagious disease, or when others in the family are already actually suffering from similar complaints. Occasionally people admit all this, but say that they are not interested. Although the discussion sometimes has to end at that point, it is usually possible, by pointing out in detail the ways in which post-mortem examinations benefit the community, to convince an intelligent person that he should be interested.

There always are at least a few cases in which permission cannot be obtained. An argument difficult to dispose of is the known objection of the patient. If he has previously exacted a definite promise that his body will not be examined, it is usually better to drop the matter. However, under extraordinary circumstances it may sometimes be pointed out that the patient made the request without having an opportunity to discuss the matter or to have explained to him its value under the particular circumstances existing at the time of his death, and occasionally relatives can be persuaded that the patient would probably have changed his mind if he had been in a position to appreciate all the factors involved. About the only other unanswerable argument is the absence of any argument at all. Occasionally one meets the stonewall type of person who simply says, "I don't want it done," gives no reasons, agrees with all the arguments, and still flatly refuses. It is worth spending time to identify the type, but once it has been identified, further discussion is wasted effort.

It should go without saying that permission should not be bought or obtained by misrepresentation or by threats and intimidations. The harm done by such tactics would in the long run outweigh any possible advantage to be obtained from an individual autopsy.

Although obtaining permission is essentially the same problem in the home and in the hospital, certain circumstances peculiar to deaths occurring at home may make it a little more difficult. Some of these factors are relatively intangible, and are related to the apparently greater aura of authority that surrounds a physician in a hospital, where he seems to the patient and his family much more definitely in control of the situation than he does in the home, where the attitude often enough is that he is merely hired to come in at intervals for the specific purpose of leaving pills. Other more definite factors are related to the fact that a higher proportion of patients dying at home die of seemingly natural and inevitable causes, such as the degenerative changes of old age, which fail to arouse the interest and curiosity of the relatives. Occasionally, oftener in homes than in hospitals, it is impracticable to obtain or even request permission

because of the unavailability of the responsible party or for some similar reason. The responsible relative may have left with others instructions that were intended to cover all contingencies and may not be available for discussion of post-mortem examinations. In some localities it has become customary in chronic illnesses when death has long been expected to call the undertaker before the doctor, or even not to call the latter at all. It is of course illegal for the undertaker to proceed without a death certificate, and this practice can be stopped by having a proper understanding with him. Although these factors will probably always operate to keep the percentage of non-hospital post-mortem examinations well below a hundred, it may be seen from this report that it is perfectly feasible to obtain a reasonably high percentage of permissions in a rural general practice.

The ideal arrangement calls for the co-operation of a pathologist or department of pathology of a medical school, in such a way that without expense to the patient a complete post-mortem examination, including histologic study, can be made by an experienced physician with a well-equipped laboratory. Nevertheless, there is no reason why any physician could not do for himself autopsies that would be sufficiently complete to be of considerable value, and when the set-up is such that the services of a pathologist are not available, such an effort on the part of the general practitioner would be well worth while.

A number of special factors pertaining to outside autopsies must be borne in mind, regardless of who does the examination. The co-operation of the undertakers serving the territory affected is important; if it is not willingly offered, it should be possible to convince undertakers that it is to their interest to co-operate, and that they are defeating their own aims by attempting to obstruct the performance of post-mortem examinations. In many cases, the undertaker's mortuary provides the most satisfactory place for the procedure, and that is far preferable to having an examination in a patient's home. The latter, however, is perfectly possible, and when necessary it can be done.

TABLE 1. *Data on Cases on Which Post-Mortem Examinations Were Performed.*

CASE NO.	AGE	SEX	CLINICAL DIAGNOSIS*	PATHOLOGICAL DIAGNOSIS†
1	67 yr.	M	Thyrotoxic heart disease	Thyrotoxic heart disease, perforated empyema of gall bladder
2	82 yr.	M	Lobar pneumonia	Lobar pneumonia
3	8 days	M	Prematurity	Prematurity
4	75 yr.	M	Coronary occlusion	Coronary occlusion
5	50 yr.	M	Carcinoma of bladder	Carcinoma of bladder
6	83 yr.	M	Cerebral hemorrhage	Myxedema
7	42 yr.	M	Brain tumor	Glioma
8	7 wk.	M	Bronchopneumonia	Otitis media, with lateral sinus thrombosis
9	2 days	M	Intracranial hemorrhage (birth injury)	Birth trauma
10	62 yr.	F	Coronary occlusion	Pneumonia
11	75 yr.	M	Arteriosclerosis (cerebral)	Hypertension
12	75 yr.	M	Carcinoma of prostate	Carcinoma of prostate, lymphatic leukemia, diabetes mellitus (?)
13	61 yr.	M	Hypertensive heart disease	Hypertension, cardiac failure
14	70 yr.	M	Cardiac decompensation, pulmonary edema	Aortic stenosis, cardiac decompensation
15	41 yr.	M	Coronary occlusion	Ruptured aortic aneurysm
16	69 yr.	M	Carcinoma of prostate	Carcinoma of prostate
17	73 yr.	F	Hypertension, cerebral accident, bronchopneumonia	Infarct of cerebrum
18	84 yr.	M	Dislocation of right knee, bronchopneumonia	Dislocation of knee, bronchopneumonia
19	81 yr.	M	Coronary occlusion	Myocardial infarct (hemopericardium)
20	0	M	Birth trauma	Stillbirth, asphyxia
21	92 yr.	F	Carcinoma of colon	Carcinoma of cecum
22	66 yr.	F	Second-degree burn, bronchopneumonia	Second-degree burn, with infection (toxemia)
23	80 yr.	M	Diabetes mellitus, sepsis	Diabetes mellitus
24	0	F	Stillbirth	Stillbirth
25	67 yr.	F	Chronic arthritis, hyperthyroidism (?), lobar pneumonia	Cardiac failure, lobar pneumonia
26	81 yr.	F	Arteriosclerosis, diabetes mellitus	Diabetes mellitus
27	56 yr.	M	Coronary infarction, cardiac decompensation, dietary deficiency	Cardiac hypertrophy, heart failure
28	78 yr.	F	Cardiac decompensation, carcinoma of breast, carcinomatosis	Carcinomatosis, pulmonary thrombosis
29	54 yr.	M	Cerebral hemorrhage (right)	Thrombophlebitis, pulmonary embolism
30	86 yr.	M	Senility, pyelonephritis, bronchopneumonia	Cerebral arteriosclerosis, infarct of brain, carcinoma of prostate
31	73 yr.	F	Arteriosclerosis, cerebral hemorrhage, bronchopneumonia	Arteriosclerosis (cerebral), cerebral hemorrhage
32	81 yr.	F	Arteriosclerosis, starvation	Generalized arteriosclerosis
33	71 yr.	M	Cerebral hemorrhage	Fracture of skull (accidental)
34	1 day	M	Intracranial hemorrhage (birth injury), prematurity	Anomalies of heart, incomplete septa

*The diagnoses listed are those that were made in writing at the time of death, previous to the post-mortem examination. For the sake of brevity and to avoid confusion, only those conditions are listed that were assumed to be directly responsible for death.

†The diagnoses listed are expressed so as to give briefly the most significant information derived from the post-mortem examination. In most cases the listing consists of the case title assigned to each case by the pathologist on the basis of the anatomic findings.

without making an undue amount of mess, on an ordinary bed and with but little special equipment. It should be performed expeditiously and quietly, and in such a way that no traces of the procedure remain.

In reviewing 34 cases on which post-mortem examinations were done, with a view to discovering just how much practical value there was in doing the examinations, the cases fall into three groups (Table 1). The first, which may be picked out at a glance, includes the cases in which the clinical and pathological diagnoses were obviously different, and in which the autopsy revealed a more or less gross diagnostic error or omission. About 6 cases fall into this group; it would be hard to deny the value of the post-mortem examination in such cases. Another 6 fall into the group in which the examination added no significant positive information, whereas the majority constitute an intermediate group, in which the findings were of considerable interest even though not unexpected or dramatic. It must not be inferred from such a classification of the cases that there is any intention of implying that autopsies are important only if they show unexpected findings: even those that reveal nothing that was not previously known are valuable in confirming the clinical findings, in filling in the details of the exact extent of the pathologic changes the nature of which was correctly suspected, and in demonstrating the absence of other changes.

These points will be illustrated by brief comments on typical cases.

Case 1. This patient was an elderly man who had been operated on for hyperthyroidism. The diagnosis of the underlying condition was clear enough, as is usually true of patients who have undergone operation with pathological examination of operative specimens. However, there were many complications only indirectly related to the thyroid disease, and the examination was most informative with regard to these. The immediate cause of death, peritonitis due to a ruptured gall bladder, was not suspected previous to the autopsy.

Case 2. The diagnosis of lobar pneumonia in this patient was confirmed, but the affected lobe was not the one expected. This was not of much importance in this particular case, but the experience has encouraged more careful physical examinations in subsequent cases.

Case 6. This patient was not observed before death, and the correct diagnosis, myxedema, might have been made if there had been an opportunity for clinical study. The facts are, however, that it was not remotely suspected on the basis of the available history, and that the implications of an unusual and instructive case would have been lost without an autopsy.

Case 8. This case brought home with greater force than any other the practical value of post-mortem examinations, for this infant might not have died if a diagnosis of otitis media had been made and treatment instituted at the proper time. Without the autopsy the diagnosis would never have been suspected. This naturally has provided a strong incentive to make routine examinations of eardrums.

Case 10. This case shows another glaring error: lobar pneumonia mistaken for coronary occlusion. The error should not have been made, but whether excusable or not, and whether prognostically important or not, the point here is that without the autopsy it would never have come to light.

Case 14. There was no question that this man died of cardiac decompensation, but the autopsy provided important information about the anatomic changes in the heart, chiefly aortic stenosis, which it was well worth while to have the opportunity to correlate with the physical findings.

Case 15. The attack of severe thoracic pain in this case was so suggestive of coronary occlusion that the diagnosis was made more or less unequivocally; but in retrospect, knowing that a ruptured aneurysm was found at autopsy, it seems as though the patient's age (41) and the known history of syphilis were leads that might have been followed up with a more careful examination, which, in turn, might have suggested the correct diagnosis. And of course this case, as well as Case 10, demonstrates the fallacy of making diagnoses of coronary occlusion without electrocardiograms.

Case 19. This was a straightforward case of coronary occlusion, but the post-mortem examination gave the interesting additional information that the terminal event was rupture of the heart, which could hardly have been diagnosed clinically.

Case 21. The carcinoma of the cecum in this case was diagnosed approximately accurately before death, but it was not possible to be certain that the palpable mass was not some other kind of tumor.

Case 28. This case was comparable to Case 1 in that the primary cause of death, carcinoma of the breast, was well understood; there were numerous complications, however, and the immediate cause of death, pulmonary embolism, was not suspected during life.

Case 29. This case gave little opportunity for study before death; however, the patient was seen shortly after the onset of the terminal attack, and long enough before death to permit a reasonably careful examination. On the basis of this the incorrect diagnosis of cerebral hemorrhage was made, and the existence of thrombophlebitis with pulmonary embolism was not suspected.

Case 30. In this case the incidental finding of unsuspected carcinoma of the prostate, of no clinical importance at the time of death, and unrelated to the patient's main difficulties, made the autopsy particularly interesting. This lesion would undoubtedly have assumed considerable importance if the patient had lived a number of months longer, and this was a point of great interest to the family.

Case 34. That this neonatal death was due to cardiac anomalies, which, incidentally, were very unusual and interesting, was a considerable satisfaction from an obstetric point of view, for the death would certainly have been credited to birth injury if the autopsy had not been performed.

The cases on which no post-mortem examination was made may be divided into groups sim-

ilar to those mentioned above. It may be seen at a glance that some of the diagnoses were vague and uncertain enough to be open to considerable question under any circumstances without an autopsy; in a few cases it was not even possible to make an intelligent guess. There is another small group in which the diagnosis was less doubtful, but still left room for question. In the majority of the cases there seemed little reason for questioning the clinical diagnosis. Again, however, there is no reason for supposing that a post-mortem examination would have been uninteresting or uninformative in even the most seemingly simple and clear-cut of these cases.

TABLE 2. *Data on Cases on Which Post-Mortem Examinations Were not Performed.*

CASE NO.	AGE	SEX	CLINICAL DIAGNOSIS
35	74 yr.	M	Diabetes mellitus
36	75 yr.	F	Hypertensive heart disease
37	45 min.	F	? (neonatal death)
38	97 yr.	F	Pneumonia
39	83 yr.	F	Hypertension, cerebral hemorrhage
40	84 yr.	F	Cerebral thrombosis
41	71 yr.	F	Carcinomatosis
42	76 yr.	M	Lobar pneumonia
43	72 yr.	F	Carcinomatosis
44	77 yr.	F	Cardiac decompensation, hypertension
45	75 yr.	M	Cardiac decompensation
46	82 yr.	M	Senility, arteriosclerosis
47	86 yr.	M	Arteriosclerosis, bronchopneumonia
48	78 yr.	M	Cerebral hemorrhage
49	78 yr.	M	Arteriosclerosis
50	88 yr.	M	Carcinoma of pancreas
51	70 yr.	F	Carcinoma of breast
52	78 yr.	F	Hemorrhage into spinal cord (?)
53	71 yr.	F	Cerebral hemorrhage
54	69 yr.	F	Hyperthyroidism (?)
55	69 yr.	M	Carcinoma of prostate
56	88 yr.	M	Arteriosclerosis
57	89 yr.	F	Arteriosclerosis
58	75 yr.	F	Senility
59	75 yr.	M	Bronchial asthma
60	70 yr.	M	Arteriosclerosis
61	92 yr.	M	Senility, arteriosclerosis
62	75 yr.	F	Carcinoma of ileum, intestinal obstruction
63	76 yr.	M	Arteriosclerosis, diabetes mellitus
64	78 yr.	F	Hypertensive cardiovascular disease

These points will be illustrated by brief comments on some of the cases.

CASE 37. This was an apparently normal newborn infant who lived 45 minutes. There was no clue in the mother's pregnancy or labor as to the cause of death, which remains unknown. Obviously an autopsy would have been helpful.

CASE 40. This exemplifies the type of case in which a presumably correct clinical diagnosis can easily be made. However, the clinical course and death attributed to cerebral thrombosis might, of course, have been due to any of a variety of intracranial lesions, and there is no way of knowing what other pathologic processes of importance may have been present.

CASE 41. There was no doubt about the diagnosis in this case — carcinoma of the breast; the exact extent of the metastatic involvement, however, and the possibility of concomitant lesions remain unknown.

CASE 50. The diagnosis of carcinoma of the head of the pancreas in this case was not much better than a guess, made largely on the basis of severe and increasing jaundice, a palpable gall bladder, and death without other obvious explanation.

CASES 52, 54 and 58. These were all cases that had presented difficult diagnostic problems, none of which had ever been satisfactorily settled, in spite of fairly careful and prolonged study. Refusal to grant permission for autopsy, which would have been essential to obtaining any definite idea of the pathologic conditions present, was particularly disappointing.

It may be seen from the above tabulations and comments that among the cases autopsied there were enough in which the examination revealed important and unexpected findings to justify doing them all on that score alone. And, similarly, among those not autopsied there was a group in which a post-mortem examination was indispensable to the making of a definite diagnosis. But once more I should like to emphasize that important and necessary as autopsies are in making diagnoses in puzzling cases, they are also of great value in confirming and amplifying clinical diagnoses, whereas the most fundamental value of all is in the opportunity for clinicopathologic correlation. In going over these cases, I am convinced that there is no question whatever that the practice of doing fairly routine post-mortem examinations has been of definite and specific value to me, and that I am practicing better medicine today than I should have been able to do if these autopsies had not been done.

In view of these experiences and observations, I believe that some provision for encouraging the performance of autopsies in a truly routine manner, both in and out of hospitals, should occupy an important place in any program that seeks to elevate the standards of medical practice and improve the quality of medical care. In the midst of heated discussion of new methods of distributing and paying for medical care, one must not lose sight of the fact that a more fundamental matter is the quality of that care, and that poor medical care is not worth distributing, by any method or at any price.

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MEDICAL PROGRESS

SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM

The Role of Vasospasm in Acute Lesions Involving Major Peripheral Vessels

REGINALD H. SMITHWICK, M.D.*

BOSTON

A NUMBER of interesting and valuable articles have appeared in recent literature concerning the role of vasospasm in acute lesions of the peripheral vascular tree. Dramatic and vastly improved results have followed timely intervention on sympathetic pathways to the vessels concerned in a number of conditions encountered in everyday practice. These reports concern the management of acute thrombophlebitides and of acute traumatic injuries of the peripheral vessels, such as gunshot wounds and lacerations, emboli and aneurysms.

ACUTE DEEP THROMBOPHLEBITIS

Thrombophlebitis has always been a very troublesome problem, particularly when it involves the large deep veins of the femoral and iliac regions. It may occur after or in association with operations, childbirth or any illness and, although rarely, may even be spontaneous. In its typical form it is sudden in onset, and may be associated with chills and fever. Very prominent manifestations are pain and swelling, the latter extending to the groin or even higher; the circumference of the leg may be increased. The extremity may be pale or cyanotic, and the surface temperature lower in the periphery. There is usually an elevation of the white-cell count, and an increased sedimentation rate. Lesser degrees of this lesion are commoner than the typical phlegmasia alba dolens, and are the result of the involvement of smaller and more peripheral veins. This condition is to be differentiated from thrombophlebitis of superficial veins, in which swelling of the entire circumference of the leg is absent. It is also to be distinguished from phlebothrombosis, which, as the name implies, is to be considered the result of thrombosis without infection, fever, swelling, pain or leukocytosis — the usual signs and symptoms of deep thrombophlebitis.

The latter is of immediate interest not only because of the symptoms, but also because of the prolonged convalescence that it has necessitated in the past. Fortunately, death from emboli is rare, in contrast to the mortality resulting from phlebothrombosis. Deep thrombophlebitis also frequently results in a varying degree of permanent swelling of the leg, which may be both unsightly and disabling. Added to this are difficulties with superficial varicose veins caused by the prolonged but rarely permanent deep venous occlusion. Troublesome ulceration related to destruction of valves in the communicating veins may also be a serious problem in later life. It is therefore of interest that so simple a measure as repeated blocking of the sympathetic nerve supply to the lower extremities with procaine hydrochloride should be followed by such dramatic changes that one may expect many of the immediate and late sequelae of deep thrombophlebitis to be largely eliminated. This form of treatment was first suggested by Leriche.[1] The results of such therapy, as well as its rationale, have been discussed in great detail in a number of communications by Ochsner and DeBakey.[2-4]

They picture the pathological physiology in the following manner: The deep venous channel is occluded by the thrombus. This serves as an irritable focus from which afferent impulses pass centrally by way of the perivenous sympathetic plexus, and result in reflex efferent vasomotor impulses to both peripheral arteries and veins. The resulting spasm of peripheral veins causes a marked increase in venous pressure, with augmentation of filtration pressure and relative anoxia of the capillary endothelium, both of which favor increased transudation of vascular fluid into perivascular tissues — in other words, edema. The arterial spasm results in a decrease in the magnitude of peripheral pulsations, which in turn makes for further stagnation of tissue fluids because arterial pulsation is essential to proper lymph flow. In their opinion, neither the mechanical blockage of the vein resulting from the thrombosis nor blockage of the lymphatics due to perivenous inflammation is of primary significance in the production of the clinical manifestations of thrombophlebitis.

To support this theory, Ochsner and DeBakey found that when the femoral vein of a dog was ligated, there resulted a marked diminution in the magnitude of arterial pulsation in the corresponding foot. If a chemical irritant (a 40 per cent

*Instructor in surgery, Harvard Medical School; assistant visiting surgeon, Massachusetts General Hospital.

solution of sodium salicylate) was placed within the lumen or in the perivascular tissue of an isolated segment of this vein, a further decrease in pulse volume resulted. However, interruption of nerve pathways by local infiltration of procaine hydrochloride around the site of the irritated segment or resection of the lumbar sympathetic ganglia and intervening trunk abolished or prevented this effect.

Clinically these authors note that in cases of thrombophlebitis there is also a reduction of peripheral arterial pulsation, and point to the fact that this may be so marked as to simulate arterial embolism. Decreased surface temperature and pallor are further evidences of arteriolar constriction. They found the venous pressure to be four or five times normal in 8 patients.

In the last year they have treated 15 patients with acute deep thrombophlebitis by paravertebral procaine hydrochloride block. In 2 cases, the process was bilateral; thus seventeen extremities were involved, only 1 being an arm. The condition followed operation in 7 cases, delivery in 4, infection in 3, and trauma in 1. Fever ranged from 99.6 to 104.8°F. There was swelling in all but one, with an increase in circumference of the extremity varying up to 9 cm. The length of time between the onset of the process and institution of treatment varied from one to twenty-eight days, and from one to six injections were required.

The following results were obtained. Relief of pain was prompt within half an hour of the first injection in many cases, and after the second or third in all. The fever disappeared in one to eight days — within forty-eight hours in approximately 50 per cent. The swelling completely disappeared in three to twelve days, the majority being relieved in ten. The length of hospital stay ranged from four to twelve days, with the exception of 2 patients, who remained for other reasons. The follow-up period varied from four to twelve months. No recurrence of edema was noted, and no other postphlebitic manifestations appeared.

For the lower extremities, paravertebral novocain block is done in either the lateral or the prone position. Four needles are inserted vertically opposite the upper borders of the upper four lumbar spinous processes, 5 cm. lateral to the mid-line. After making contact with the corresponding transverse processes, the needles are inclined slightly inward and inserted 5 cm. deeper. Five cubic centimeters of 1 per cent procaine hydrochloride is injected through each needle.

To denervate the upper extremity, Ochsner and DeBakey recommend the anterior approach, inserting one needle just above and 1 cm. medial to the center of the upper border of the clavicle, horizontal and at an angle of 45° with the mid-line, thus contacting the side of the body of the seventh cervical vertebra or the ligament between that and the first dorsal vertebra. Ten cubic centimeters of 1 per cent novocain are injected. Caution must be taken to prove by aspiration that the needle is not in a blood vessel, in the spinal canal or within the pleural cavity. Similar precautions should, of course, be observed when blocking the lumbar trunk.

They believe that the injections should be repeated every forty-eight hours as long as the fever persists. They also emphasize that treatment should be instituted promptly. They prefer repeated novocain block to alcohol injection, since maximal vasodilation follows each injection, whereas if the sympathetic ganglia and chain are destroyed by either surgical removal or alcohol, the maximal response occurs for a short period and cannot be repeated.

Although some might disagree with the dismissal of mechanical blockage of a thrombosed vein or perivenous lymphatic blockage as playing an unimportant role in the production of the manifestations of acute thrombophlebitis, and although others might disagree with the technic of paravertebral novocain block, few would fail to agree that the clinical results of this form of treatment are good. If late perivenous fibrosis and lymphatic obstruction are prevented, — and there seems every reason to believe that they will be, — there should be no recurrence of the edema. It seems possible also that inhibition of venous spasm may shorten the period of complete venous obstruction and may result in a more rapid recanalization of the involved segment. This should lessen the incidence of superficial varices, and of ulceration due to incompetence of communicating veins.

Acute Lesions of Large Peripheral Arteries

Acute interference with the main arterial supply to an extremity may result disastrously for the limb and even the patient. This is apter to happen in the leg than in the arm. Survival of the extremity depends to a large extent on the state of the collateral circulation, the nature and location of the lesion, the age of the patient, the presence or absence of organic vascular disease or serious disease elsewhere in the body, and the promptness with which treatment is instituted. Too frequently, however, extremities have had to be sacrificed in spite of all efforts to save them, even when conditions were most favorable. Recent reports emphasize that many of these extremities can be saved if the importance of associated vasospasm is appreciated and promptly eliminated.

Whether the acute arterial deficiency is due to

a gunshot wound, to a traumatic laceration, to an embolus, to surgical ligation of a normal artery, to acute interruption of main-vessel blood flow in the process of obliterating, ligating or excising a peripheral aneurysm, or to spontaneous rupture or thrombosis of the latter, the effect on the collateral circulation, even when adequate beforehand and not the site of organic disease, is extremely important. In all these conditions, the main-vessel flow is effectively blocked, and may be still further occluded by both distal and proximal thrombosis. The only possible source of supply to points distal to the obstruction or site of injury is collateral circulation.

When a large peripheral artery is suddenly occluded, a rather characteristic group of signs and symptoms is noted, commencing with pain and cessation of peripheral pulsation, and followed by various color changes in the skin — usually a mottled combination of pallor and cyanosis. The limb distal to the obstruction becomes anesthetic and cold, and voluntary motion diminishes or disappears. If this condition is allowed to persist for more than a few hours, irreversible changes usually take place, and the extremity becomes gangrenous in a very high percentage of cases.

These changes are undoubtedly similar to those described by Carcassone and Haimovici (De Bakey[5]). The former introduced a balloon into the femoral artery of a dog and found that when the blood flow was quickly and completely obstructed by inflation a characteristic response occurred. This consisted of spasm of the main artery distal to the obstruction, which also affected arterioles and even capillaries. This vasospasm involved the collateral arteries in the neighborhood of the obstruction and at a distance as well. If, however, the occlusion was gradual or incomplete, this diffuse vasospastic response was not initiated.

That intense spasm of the main artery always exists distal to an occluding embolus and presumably involves the collaterals is well known, and has been noted many times at operation. That perivascular trauma may result in intense segmented arterial spasm simulating occlusion is also appreciated.

The importance of this mechanism has been recently discussed in great detail by Gage and Ochsner,[6] who report a number of successful results following sudden occlusion of major peripheral vessels. They demonstrate that in man as in animals, this diffuse vasospasm can be abolished by excision or temporary destruction (by alcohol) of the sympathetic nerve supply to the extremity. When this is done in conjunction with surgical procedures such as ligation, division or obliteration of the major arteries, the outcome has been uniformly successful even when inadequate collateral circulation was known to have existed previously. The technic for sympathetic block is the same as that described in connection with the treatment of acute deep thrombophlebitis. The needles are left in place for twenty to thirty minutes. When a rise in surface temperature and inhibition of sweating demonstrate the block to be successful, 5 cc. of 95 per cent alcohol is injected through each needle.

Their results are of interest and follow:

> We have used the physiologic method, i.e., sympathetic block, of increasing the collateral circulation as a preliminary procedure to the ligation of major peripheral arteries in 10 cases. In all but 2 of these cases the collateral circulation was found to be inadequate by the Matas compressor test. In the other 2 cases, one of which was an aneurysm of the common iliac and the other a stab wound of the common femoral, the test could not be applied. Of these 10 cases, 1 was a mycotic aneurysm of the right common iliac artery. Following sympathetic block and ligation of the common iliac at its origin, there was no change in color and no decrease in temperature of the corresponding extremity. There were 2 cases of arterial aneurysm of the femoral artery and 3 cases of popliteal aneurysm that were cured by obliterative endoaneurysmorrhaphy. Three of the cases consisted of arteriovenous aneurysm, 2 of which were femoral and 1 was popliteal. These were treated by quadruple ligation. There was 1 case of stab wound of the common femoral, which required ligation. In none of these cases of ligation of the major peripheral arteries treated by preliminary sympathetic block was there any evidence of ischemia or deficiency of the peripheral circulation. We have also used sympathetic block in 4 cases of embolus of the femoral artery. In 1 case the embolus was removed after sympathetic block. The other 3 cases were not operated upon. In all these cases the classic clinical manifestations of arterial embolism were present. Following novocain block of the lumbar sympathetic ganglia and chain on the affected side, there was a loss of numbness and a return to normal of color and temperature to the extremity. In peripheral arterial embolism there is not only a high incidence of ischemic gangrene but a high mortality, the gangrene increasing the mortality. Therefore, we believe that sympathetic block will not only materially decrease the incidence of ischemic gangrene but will also lower the immediate mortality.

By contrast with the results in similar cases in the past, these are, to say the least, impressive. Ligation of the main vein at the same level as the artery has lowered somewhat the incidence of ischemic gangrene. It was not done in these cases, and the results are far better than one could expect in similar cases treated by simultaneous ligation of major arteries and veins. Peripheral aneurysms have been successfully treated with a rather low incidence of gangrene if operation was deferred until the collateral circulation was found to be adequate. Use of the Matas compressor has been most helpful in this connection. However, when rupture, or thrombosis, or rapid increase in size of the aneurysm had taken

place, forcing surgical intervention before the collateral circulation was adequate, the incidence of gangrene was high. Furthermore, a significant percentage of extremities were lost after removal or obliteration of aneurysms, even if the collateral circulation was known to be adequate beforehand. The saving of four consecutive extremities after embolic occlusion of the common femoral artery without removal of the embolus in three is noteworthy. The incidence of gangrene in the past, whether or not the embolus was removed, has been approximately 70 per cent.

The importance of these results cannot be overemphasized. The sympathetic supply should be interrupted by one method or another either at the time of or before operations that will result in sudden occlusion of major vessels. When spontaneous occlusion has occurred, as from embolism, laceration or thrombosis, the time factor is extremely important. Treatment, with or without embolectomy or other vascular surgery, should be instituted immediately — within an hour or two if possible, certainly within six hours. Every hour lost is important, because if diffuse vascular thrombosis is allowed to take place, the extremity is doomed. Thrombosis is due to stagnation of circulation and damage to the endothelium of the vessel wall resulting from anoxia. After this has occurred, release of vasospasm will no longer be followed by restoration of adequate blood flow.

The question of the best method of interrupting vasomotor pathways to the extremities has been raised by Veal,[7] who advocates surgical interruption of sympathetic pathways at the time of repair of aneurysms of the extremities. He prefers this to chemical block (by alcohol) because it is more permanent, and better late results are to be expected. He reports 3 cases treated by combined sympathectomy and repair of aneurysms by multiple ligation or endoaneurysmorrhaphy. The arteries involved were the brachial, the femoral and the popliteal. The aneurysm of the latter was spontaneous; the others resulted from a laceration and a gunshot wound. In all, a rapid development of collateral circulation after operation was demonstrated by arteriography.

Alcohol injection appears to be the method of choice in treating patients in shock or the average case of embolic occlusion; the latter is nearly always associated with a serious cardiac lesion, so that the possibility of multiple episodes should be kept in mind.

Denervation of the lower extremity by alcohol injection is less difficult and less dangerous, and is followed by a much lower incidence of peripheral neuritis, than denervation of the upper extremity. Surgical excision of the appropriate portion of the lumbar sympathetic trunk is likewise easier than the operation necessary to denervate the arm. The technic of these operations has recently been described in detail.[8]

It seems wise to denervate the lower extremity surgically when one is able to choose between the two methods, particularly if a prolonged and permanent effect is desired.

Paravertebral alcohol injection of the sympathetic supply to the upper extremity is difficult to perform and somewhat dangerous, and is followed by a high incidence of brachial and intercostal neuritis. It should be used principally as an emergency technic. Surgical denervation by preganglionic section seems the method of choice in treating other lesions. Much the same opinion about the advantages of surgical excision over alcohol has recently been expressed by Flothow[9] after years of experience with both methods; he had previously favored alcohol.

Prompt intervention designed to interrupt vasomotor pathways to the extremities by one method or another is indicated in the treatment of acute occlusion of major peripheral vessels. This abolishes vasospasm and will lower the incidence of gangrene, which it has precipitated too frequently in the past.

If extensive thrombosis occurs, gangrene will follow. It seems appropriate to call attention to the use of heparin to prevent thrombosis. Murray[10] recently published a summary of early experiences with this substance, and the indications are that it will prove to be an extremely valuable adjunct in the management of vascular lesions, particularly in reconstructive operations on major arteries after embolectomy, as well as in the treatment of thrombophlebitis. Elimination of vasospasm, combined with intravenous administration of heparin to prevent thrombosis, should go far toward reducing the high incidence of ischemic gangrene following the sudden occlusion of major peripheral arteries.

319 Longwood Avenue

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27081

PRESENTATION OF CASE

First Admission. A fifty-eight-year-old Italian laborer entered the hospital complaining of progressive enlargement of the abdomen of three weeks' duration.

The patient was seen for the first time four years before admission, when he entered the hospital complaining of sharp, postprandial, epigastric pain relieved by food and alkalis of four months' duration. The day before admission, hematemesis occurred. X-ray studies and gastroscopy revealed a macroscopically benign 1-cm. ulcer on the lesser curvature of the stomach with an associated gastritis; the esophagus appeared normal. In addition the patient was found to have a hypochromic anemia, acute gonorrheal urethritis and a positive blood Hinton test. A Takata-Ara test was positive, and bromsulfalein tests varied from 5 to 30 per cent retention. He was discharged six weeks later on a dietary regime, and at that time x-ray examinations showed a satisfactory reduction in the size of the ulcer.

Second Admission (ten months later). In the interval, the epigastric pain had gradually increased with the onset of anorexia and frequent gastrointestinal upsets; one week before admission the patient had vomited a grossly blood-free material. He had lost 15 pounds. The additional and abnormal findings were as follows: There was tenderness over the entire epigastrium, and the liver was palpable two fingerbreadths below the costal margin. Examination of the heart and lungs was negative, the peripheral arteries were tortuous, and the blood pressure was 180 systolic, 80 diastolic. X-ray films showed slight enlargement of the heart in the region of the left ventricle, with a tortuous aorta and calcification in the aortic knob. The stools were guaiac negative, the blood Hinton test positive; anemia was no longer evident. On the second hospital day, a partial gastrectomy and Polya anastomosis were performed. Pathological examination showed a benign gastric ulcer on the lesser curvature. Postoperative x-ray studies showed a poorly functioning anastomosis, with almost complete retention of the barium; the anastomosis was therefore explored ten days later. It was found that the opening through the transverse mesocolon had slipped down over the afferent and efferent loops of the Polya anastomosis, with consequent kinking of the jejunum. This was repaired with satisfactory results, and the patient was discharged six weeks after admission, following an essentially uneventful convalescence.

Final Admission (three years later). In the previous three years the patient had been well except for a slight feeling of weakness; his gastrointestinal symptoms were relieved completely, and he had gained 17 pounds. Three weeks before admission, he noticed a progressive, painless enlargement of his abdomen. Soon this was followed by swelling of the ankles, scrotum and penis, worse in the evening, absent in the morning. Occasionally there was a dull pain in the subcostal region on both sides, and he complained of dyspnea on exertion and a chronic cough with white sputum but no hemoptysis. Although his appetite remained good, it was appeased by two slices of bread and a small amount of vegetables. His urine became scant and dark; there was no change in the character of the stools. No history of alcoholic overindulgence was obtainable.

The past and family histories were irrelevant.

On examination the patient was well developed and well nourished, but in no apparent distress; the skin and scleras were slightly icteric. Examination of the heart showed slight enlargement to the left, with a harsh systolic murmur over the precordium, heard maximally at the apex. Examination of the chest revealed dullness to percussion, diminished tactile fremitus and voice sounds over the right back below the eighth rib, up to the third rib in the axilla and below this level anteriorly. The abdomen was markedly distended, dome shaped, tense and tympanitic to the flanks; shifting dullness was present. Liver dullness was present to a point 5 cm. below the costal margin. There was pitting edema of the legs, sacrum, scrotum and penis. Rectal examination was negative. Examination of the nervous system was negative.

The temperature was 101°F., the pulse 85, and the respirations 20.

Examination of the urine showed a ++ test for albumin and a + to ++ test for bile; the urobilinogen was positive up to a dilution of 1:80. Examination of the blood showed a red-cell count of 4,000,000 with a hemoglobin of 75 per cent, and a white-cell count of 8400 with 73 per cent polymorphonuclears. The serum van den Bergh was 4.5 mg. per 100 cc., biphasic, a bromsulfalein test showed 55 per cent retention, and a formol-gel

test was positive. The nonprotein nitrogen of the blood serum was 22 mg. per 100 cc., the total protein 6.97 gm., with 2.28 gm. albumin and 4.69 gm. globulin (ratio 0.49). The prothrombin time was normal; a hematocrit reading was 42.1 per cent. Blood Hinton and Wassermann reactions were positive. The sputum was essentially negative, and no tubercle bacilli could be found in a smear. Examination of the stools was negative.

X-ray films of the chest showed the diaphragm to be unusually high, with atelectasis at the right base. There was a diffuse mottled density involving the greater portion of the left upper lobe, with a suggestion of a cavity overlying the first rib. The heart was normal, the aorta calcified. There were no enlarged lymph nodes, and no metastases were seen in the bones.

A gastrointestinal series showed a wide esophagus with extensive curling (adhesions), but definite varices could not be demonstrated. The abdomen was huge and dense. The lower two thirds of the stomach had been resected, and there was good function of the anastomosis and no evidence of disease in the stomach. Marked degenerative changes were present in the lumbar spine. There was no evidence of splenic enlargement.

The patient was placed on a high-calorie, high-vitamin diet and intravenous 25 per cent glucose, and an attempt was made to improve kidney excretion. An abdominal paracentesis yielded 3500 cc. of clear straw-colored fluid with a specific gravity of 1.012; this procedure was repeated on the fifth hospital day, when 5000 cc. of fluid was obtained. The serum van den Bergh was then 5.5 mg. per 100 cc., the white-cell count 11,200. Fluid gradually accumulated at the lung bases, especially on the left, and the patient became drowsy and coughed a great deal. An x-ray film of the chest three weeks after admission showed a homogeneous density on the left side, with an increased, more localized density in the infraclavicular area. This localized area had markedly increased since the previous examination. The right side was unchanged. The sputum grew a few colonies of beta hemolytic streptococci, and a blood culture was negative; the temperature was 102°F., and the white-cell count 19,000. Finally, fluid became still more pronounced at the lung bases, but the ascites seemed to diminish. The patient's breathing became labored, his color was ashen and icteric, and edema of the hands developed. Death occurred one month after admission. Throughout hospitalization, the temperature spiked to 102°F., gradually tending to remain elevated until the last four days, when it dropped below normal.

Differential Diagnosis

Dr. Thomas V. Urmy: May we see the x-ray films?

Dr. Aubrey O. Hampton: On first inspection of these films, I am inclined to disagree with the report. The esophagus does not look normal to me. I should hesitate to rule out varices. True, the patient had curling or adhesions to confuse the picture. I should certainly suspect that he had varices.

Dr. Urmy: Am I correct in believing that the X-ray Department attaches no significance to curling?

Dr. Hampton: It does not mean anything. It just makes the examination more difficult in a case in which one suspects varices.

I suppose you are most interested in the chest. The films were taken twenty-one days apart. I do not believe that the heart is enlarged. The aorta shows calcification without dilatation. There was extreme arteriosclerosis.

Dr. Urmy: Is the dome of the diaphragm nodular or irregular?

Dr. Hampton: You cannot see it quite well enough to be sure, but I do not believe it is either nodular or irregular. The liver does not look large.

I do not know what this is in the left upper lobe. There is rapidly progressive consolidation, and it appears that there are cavities without a shift in the mediastinum. It does not look like tuberculosis, but rather like some acute infection. At this time the patient had pleural disease also, and there is probably a diffuse effusion over the left lung.

Dr. Urmy: The cavities have increased tremendously.

Dr. Hampton: Yes, unless they tapped his chest. The cavities in his chest look more like those due to gangrene than those produced by abscess or tuberculosis.

Dr. Urmy: For the sake of simplicity I think we can eliminate a certain amount of the history. The first four years seem mainly concerned with a condition that does not play any part in the final admission. The patient first came in with a hematemesis and a story consistent with ulcer. Although such a lesion was demonstrated both by x-ray examination and gastroscopy, there was also some gastritis, which might have been the source of the bleeding. In addition there was a suggestion of liver disease because of a positive Takata-Ara test and a sometimes abnormal bromsulfalein test. However, the correctness of the diagnosis of ulcer as the source of the hemorrhage and the cause of the symptoms seems to have been

borne out by the subsequent course, since the gastric resection apparently relieved all symptoms, except for slight weakness, for a period of three years. In the light of the final admission, we are mainly interested in the early suggestion of hepatic disease. The liver was probably not enlarged at the early admission. I also view as significant the statement that the patient remained weak during the three years between his second and third admissions; this is consistent with chronic hepatic disease. At the first admission a probable diagnosis of syphilis was also made. The positive Hinton test was confirmed at the third admission.

When we reach the final admission, we should like to know more about the patient's syphilis, especially whether he had had treatment during the interval and, if so, what sort of drugs had been used, because as we go along we wonder whether arsenic poisoning might have entered the picture. We also wonder whether the patient had had sufficient treatment to eliminate active syphilitic disease of the liver.

On the third admission the patient showed ascites and edema. The ascites had come first, which is suggestive of portal obstruction in addition to a more generalized cause of edema. Therefore in view of the knowledge of probable liver disease it seems logical to try first to connect the ascites and edema with a diseased liver. Liver disease is borne out by various observations at the last admission. The patient was icteric. The size of the liver was uncertain. On physical examination it was found enlarged to percussion, but this finding is of dubious value because the abdomen was markedly distended. The liver edge was evidently not actually felt, nor do we know whether it was palpated later after abdominal tap. The x-ray plates seem to refute the suggestion that there was enlargement. The spleen also was not enlarged, according to the x-ray films. Various laboratory tests pointed to hepatic disease. The increased urobilinogen in the urine could be due to increased blood destruction, but with a biphasic van den Bergh, not an indirect reaction, I think we can assume the cause to be impaired hepatic function. The albumin-globulin ratio was quite striking. A marked drop in albumin with a rise in globulin is consistent with hepatic disease; in fact, in the absence of appreciable loss of albumin in the urine, it is very strong evidence of severe liver damage. The bromsulfalein, as well as the formol-gel, test is also confirmatory.

We might consider cardiac edema because the patient complained of dyspnea and is reported to have had a loud cardiac murmur that was not noted at the first admission. He also had cough. On the other hand, the heart was probably not enlarged, and the murmur not typical enough to permit a diagnosis of valvular disease. The lack of enlargement alone is enough to make one think that the heart was not impaired. In addition, heart disease could not, of course, explain all the physical and laboratory findings. I should not seriously consider either nephrosis or nephritis as the cause of the edema. We might mention infection in the peritoneum as a possible cause of the ascites, but it would not explain much more of the clinical picture. When the abdomen was tapped, the fluid had a specific gravity of 1.012, which is certainly on the transudate side, although a little higher than most transudates. There is no mention of cellular elements. However, I think we can be sure that the fluid was a transudate and not an exudate.

Another important part of the picture is the pulmonary disease, which Dr. Hampton has not been able to classify, and which I am quite certain I cannot. According to the history, the patient had had a chronic cough. On the other hand, x-ray studies within three years had not shown any pulmonary disease. We can say that the condition was progressive and probably of rather recent origin. Tuberculosis is not ruled out by one sputum examination. We can think of pneumonia, and perhaps that is the most tenable diagnosis, in spite of the fact that no pneumococci were found in the sputum. That is as far as I can go. There was infection in the lung, and there was also pleural fluid, which I should judge to have been part of the general fluid disturbance, although it is curious that the collection was on the left side instead of the right, where we should expect it to have been more marked.

The patient ran a higher temperature than most people with cirrhosis do, even in the terminal stage. The chest condition was, I think, the major cause of the fever. This assumption is borne out by the white-cell count, which rose instead of declining, as it does in liver failure. Furthermore, I think we can assume that the rapid progress of hepatic insufficiency was accelerated by the chest infection and that the patient's death was due not exclusively to liver failure but also to general toxemia from infection. Another possible explanation of the increased fever is cancer; and cancer does, of course, sometimes develop in a previously cirrhotic liver. One other explanation of the higher fever than that usually seen in cirrhosis is gumma of the liver. We might seriously consider gumma if we knew that the patient had not had treatment for syphilis.

In many cases of portal cirrhosis we find posi-

tive blood Hinton tests and wonder how much of a part syphilis is playing. At the postmortem, scarring typical of syphilitic cirrhosis is not found as a rule. I think, therefore, that on the law of averages this case will show a nonsyphilitic cirrhosis. The history of alcohol is a bit difficult to interpret. The history taker believed that the patient had not overindulged in alcohol, but does not tell how much he consumed. However, the patient was an Italian, and we have seen Italians in this hospital with portal cirrhosis who have only drunk wine. It is possible to interpret the statement in the history to the effect that he had been a wine drinker, but not a drinker of hard liquor. Antisyphilitic treatment — arsenic — I have mentioned as a possible factor in precipitating hepatic failure.

In summary, then, I think that the patient had a portal cirrhosis of the liver; he had had signs of the disease for at least four years before the final admission, but his liver had functioned fairly well until a short time before the last admission. His very rapidly downhill course at the end was, I believe, due to a new factor in the picture: a fairly acute pulmonary infection, apparently nontuberculous. He evidently also had syphilis, which may have played a part in producing the liver disease. There was, in addition, hypertension of a mild degree, but probably no important cardiac lesion. I do not believe that the previous ulcer and resection played any part in the final picture.

Clinical Diagnoses

Cirrhosis of liver, toxic.
Varices of esophagus?
Tuberculosis of lung, left upper lobe?
Bronchopneumonia, terminal.
Hydrothorax, left.

Dr. Urmy's Diagnoses

Portal cirrhosis of the liver.
Syphilis.
Hypertension.
Pneumonia?

Anatomic Diagnoses

Alcoholic cirrhosis of liver.
Esophageal varices.
Jaundice.
Ascites.
Peripheral edema.
Pulmonary tuberculosis, with cavitation (left upper lobe).
Empyema, left.
Syphilitic aortitis.
Operative wounds: Polya resection of stomach, old; paracentesis, old and recent; peritoneoscopic incision, recent.

Pathological Discussion

Dr. Tracy B. Mallory: The post-mortem examination showed, as Dr. Urmy predicted, that the chief cause of death was cirrhosis of the liver. The liver was fairly small, weighed only a little over 1000 gm., and was definitely atrophic, very finely and diffusely granular and extremely tough when one attempted to cut it. On microscopic examination it showed hyaline degeneration, which we ordinarily associate with alcoholic cirrhosis and with alcoholic cirrhosis produced by drinking something stronger than Italian red wine. The Italian patients, as we see them in this hospital, show a disproportionately high incidence of cirrhosis, but do not show this very finely granular type of liver and do not show hyaline degeneration. This liver would have passed for an Irishman's. There were esophageal varices; they were not large, however. The spleen was quite small, weighing only 250 gm. The left pleural cavity contained over 2 liters of cloudy fluid, and the left lung showed numerous cavities surrounded by miliary tubercles and areas of caseous pneumonia. The patient did have morphologic evidence of syphilis. The ascending aorta was definitely dilated, showed atheroma greater than that of the descending aorta, a good deal of longitudinal wrinkling and a few stellate scars. The sinuses of Valsalva were markedly dilated, and they were so capacious that one could very easily have put a large marble into each sinus. The mouths of the coronary arteries were constricted.

Dr. Hampton: Do you think that syphilis had anything to do with the extensive calcification in the aorta?

Dr. Mallory: It may have. I think there is no question that syphilis of the aorta predisposes to particularly severe atheroma of the segment involved by the syphilis. There was very slight separation of one of the aortic commissures, but not enough to produce free regurgitation.

CASE 27082

Presentation of Case

A sixty-nine-year-old woman entered the hospital complaining of upper abdominal pain.

For years the patient had been troubled with indigestion and a feeling of heaviness in the left upper quadrant of her abdomen, associated with gaseous eructations and belching of sour, burn-

ing material; soda relieved these symptoms. For the previous month she had noticed a "dark-brown" taste in her mouth each morning, and on one occasion three weeks before admission she thought that her skin was yellow. After a meal, six days before admission, the patient was seized with a severe aching pain in the epigastric and periumbilical regions. Nausea and vomiting soon followed, and although the pain became steadily worse, it was relieved to some extent by lying down; the vomitus was dark brown and bitter. She remained in bed until the time of admission; pain was present most of the time, but fluctuated in its severity. Vomiting continued, and her abdomen became slightly distended.

The patient had been in the habit of taking salt laxatives two or three times a week for some time. During the month before entry she had found it necessary to increase the dosage, and the day before and again on the day after the onset of abdominal pain she took still larger doses. Evacuation was copious on both occasions. However, she had had no bowel movements during the four days before admission and had eaten nothing. Furthermore, the patient stated that she had always consumed large quantities of water, and that for the previous six months she had urinated on an average of three times during the night and four times during the day.

The patient had had diphtheria and the usual childhood diseases. Ten years before admission she had had a radical mastectomy for cancer, and seven years before entry an appendectomy, followed shortly afterward by the repair of an incisional hernia. Five sisters and three brothers were said to have died of either tuberculosis or "inflammation of the bowel."

On examination the patient was well developed, obese and apparently ill. A healed mastectomy incision was present in the right chest. Examination of the heart was negative; the blood pressure was 150 systolic, 100 diastolic. Fine crackling rales were heard at the left lung base. The abdomen was distended and tympanitic, with generalized tenderness; high-pitched peristaltic sounds were heard best over the umbilicus. The reflexes were normal.

The temperature was normal, the pulse 110, and the respirations 22.

Examination of the urine showed a ++ test for albumin and +++ test for sugar. Examination of the blood showed a red-cell count of 5,890,000 with a hemoglobin of 18.9 gm. (photoelectric-cell technic), and a white-cell count of 13,600, of which 84 per cent were polymorphonuclears. The nonprotein nitrogen of the blood serum was 35 mg. per 100 cc., the chlorides 100.1 milliequiv. per liter, and the blood sugar 294 mg. per 100 cc. A blood Hinton test was negative. The stools were brown and guaiac negative on two examinations; the vomitus was also guaiac negative.

A plain x-ray film of the abdomen showed a number of gas-filled, slightly dilated loops of small intestine. The one in the mid-abdomen appeared to be ileum, the others suggested jejunum. There was a small quantity of gas in the stomach, but none was seen in the colon.

Attempts to insert a Miller–Abbott tube resulted in failure, for it would not pass the pylorus. Very little drained from the stomach, and abdominal distention and tenderness increased. The patient was given insulin and glucose, the fasting blood sugar ranging between 180 and 295 mg. per 100 cc. An x-ray film of the abdomen two days after admission showed that the loops of small bowel formed a stepladder pattern in the left side of the abdomen; the Miller–Abbott tube still lay in the stomach. The next day, moisture developed in the right lung base, without signs of consolidation; the white-cell count was 10,400, the temperature 99.7°F., the pulse 100. On the sixth hospital day an exploratory laparotomy was performed under spinal anesthesia through an old midline herniarepair scar. There were no omental adhesions at the site of the previous operation, and no free fluid. Uniformly dilated small bowel could be observed down to the region of the ileocecal valve, and no areas of collapsed bowel were found. The cecum was pulled into the right upper quadrant by an omental attachment, which was firm and sclerotic, and beyond this it was obviously edematous, as the result of a recent inflammatory process; this was freed up. The cecum was markedly dilated, as was the transverse colon to the splenic flexure; the descending colon was approximately one fourth the diameter of the transverse colon. Nothing suggestive of cancer could be found in the region of the splenic flexure. The balance of the colon down to the rectum was explored, but nothing could be found to explain the patient's symptoms. There were no areas of fat necrosis, and although there was some scarring of the undersurface of the liver and around the duodenal cap, no mass could be outlined in the gall bladder or head of the pancreas. No explanation could be offered for the failure of the Miller–Abbott tube to pass into the pylorus. The pelvis and its organs appeared normal. Because of the symptoms of intestinal obstruction, the dilated cecum and the uniformly dilated bowel down to the ileocecal valve, a cecostomy was performed through a McBurney incision.

Differential Diagnosis

Dr. Claude E. Welch: This is a case in which I believe it is important to review the past history to look for leads that might explain the events to follow. The pains in the left upper quadrant of the abdomen and the gas and belching, relieved by soda, both point to either the stomach — possibly an ulcer, possibly gastritis, possibly diaphragmatic hernia — or the gall bladder. The "dark-brown" taste means nothing to me. The fact that she thought her skin was yellow may or may not be of significance. If it were accepted as true, it would give some indication that the biliary system was at fault.

From the history, there are two or three other organs that we can identify as possible causes of trouble. From the story of increasing constipation, of course, we wonder immediately about the colon. Then the suggestion of diabetes brings the pancreas into mind. With an operation for carcinoma of the breast and an appendectomy followed by adhesions, we have two other causes for intra-abdominal difficulty.

Her present illness of six days' duration is important in two respects. The pain began in the epigastric region and was followed very shortly by nausea and vomiting, and I should infer from the history that the vomiting was almost continuous from that time and that the pain remained in the same location. That will be very important when we discuss the site of her difficulty a little later.

The physical examination gave evidence of ileus of some type, almost certainly dynamic, in view of the high-pitched peristaltic sounds. The white-cell count is of a great deal of interest, because that, combined with a normal temperature, more or less eliminates an inflammatory lesion and makes us think much more of mechanical obstruction. The blood chemical findings are not abnormal except for the evidence of diabetes.

The only thing not mentioned on physical examination is the rectal examination, which I assume we may regard as negative.

Dr. Aubrey O. Hampton: This patient had almost daily x-ray examinations, beginning on the third of the month and extending to the seventh. During that time she had dilated loops of small bowel that varied somewhat in size, and occasionally gas was visible in the colon. The frequent examinations were directed mostly at determining the progress of the Miller–Abbott tube. The tube would not go through the pyloric valve, no matter what we did. Multiple fluoroscopies and all sorts of manipulations were of no value. Finally she was given some barium to see why the tip of the tube would not go through the pylorus. Only a swallow was given, and we found a definite abnormality in the duodenum. This is the tip of the tube. This is the cap, and this is a hooklike projection at the beginning of the second portion of the duodenum, a very queer-looking deformity. Then we looked back over our films and found some gas shadows above their usual position, high up in the region of the liver, rather linear-looking shadows.

Dr. Welch: Was gas in the colon prominent in the early examinations?

Dr. Hampton: No; in the beginning we saw very little gas in the colon, and it was only some time later that we found it. She had a period of improvement, and at that time the gas passed into the colon.

Dr. Welch: Dr. Hampton has been extremely helpful, for a change, I should say. The failure of the Miller–Abbott tube to pass the pylorus usually does not mean anything at all. It may fail when the patient is perfectly normal. We have had several cases in which it refused to pass owing to an inflammatory lesion in the pylorus or just beyond it in the region of the duodenum, ascending colon or gall bladder. With the x-ray findings that Dr. Hampton has pointed out, one must, of course, pay a good deal of attention to the possibility that there was an inflammatory lesion just beyond the pylorus.

Obviously the patient was not improving, and for relief of obstruction it was consequently necessary to do an exploratory laparotomy. I wonder what the surgeon's preoperative diagnosis was. I should imagine that he probably considered adhesions as the probable source of the difficulty, because of the previous abdominal operation. The extreme completeness of the operative note is quite remarkable in view of the fact that the patient must have had dilated loops of small bowel making the exploration difficult. "Uniformly dilated small bowel could be observed down to the region of the ileocecal valve, and no areas of collapsed bowel were found." That is prima facie evidence that the obstruction was lower than that. One would imagine that the "inflammatory process" was the same thing that Dr. Hampton pointed out in relation to the second portion of the duodenum. "There were no areas of fat necrosis, and although there was some scarring of the undersurface of the liver and around the duodenal cap, no mass could be outlined in the gall bladder or head of the pancreas." In other words the operative findings in that site were not so remarkable as the x-ray findings.

This operative note makes the record more or less like an Agatha Christie story. Every organ

was explored and found to be normal, and yet we know one was not normal. In the first place, I think we might as well rule out unusual causes of ileus, such as metastatic carcinoma of the breast involving the spinal cord and producing a paralytic ileus. The story is not suggestive of that. Some renal lesions would produce paralytic ileus, but again that is unlikely, because this is a story of dynamic rather than paralytic ileus. We are therefore left with some lesion that must be intrinsic in the bowel itself, or pressing from the outside in such a fashion as to occlude it.

Our next problem is to localize the obstruction in the large bowel or small bowel. Obviously the operator believed he was dealing with a lesion in the splenic flexure, although it was impossible to feel it, a likely supposition because it is almost impossible to feel carcinoma obstructing the splenic flexure. There are a few features against large-bowel obstruction, however. In the first place, the pain was in the epigastrium when it began. It was followed immediately by vomiting, and the vomiting persisted for a period of six days. That is a very unusual story for acute large-bowel obstruction, in which vomiting may initially occur, but then is absent for a period of days. Finally the small bowel became loaded with fecal matter, and fecal vomiting finally occurred. In other words, from the story the obstruction was high in the small bowel. The guaiac-negative stools are also of interest, and the x-ray picture shows absence of gas in the colon in the early stages of the disease, when the patient obviously had obstruction of the small bowel. In favor of large-bowel obstruction is the fact that the cecum and transverse colon were dilated, as well as the splenic flexure. That brings up the problem, then, of what it would be possible to overlook in the abdomen, so far as the intestinal tract is concerned, at the time of operation. Assuming the patient had a large-bowel lesion, what would be overlooked? Most likely a carcinoma of the splenic flexure, possibly volvulus, especially of the cecum. That is ruled out, since the cecum was bound down by adhesions. Furthermore, volvulus of the sigmoid is ruled out by the fact that there was no distention of the descending colon. In other words, the only thing that could be overlooked in the large bowel, I believe, is carcinoma of the splenic flexure.

Could anything be overlooked in the small bowel? The operative note says the small bowel was observed down to the region of the ileocecal valve, and no areas of collapsed bowel were found. This does not exclude obstruction of the small bowel. I think probably all of us have seen, for example, distention of the rectum beyond the obstructing lesion, and occasionally we have observed the same thing in the small bowel following inflammatory adhesions. There is distention not only proximal but distal to the point of obstruction after the disease has gone on for a certain length of time. I am inclined to believe that is so in this case, and I am also led to think that the small bowel was not observed inch by inch from the ileocecal valve to the ligament of Treitz. It seems to me that is the likeliest site for something to be overlooked.

What lesions in the small bowel could be overlooked? The patient obviously had no strangulating obstruction with volvulus and no intussusception, because she had no free fluid in the abdomen. Could there be some internal hernia that was not observed? That is entirely possible. Could she have had a tumor of the small bowel that was not observed, probably one of the benign type, such as carcinoid? Again, that is a possibility. Could she have had a foreign body obstructing the small bowel? If there were a foreign body, the commonest would be a gallstone. Dr. Hampton has kindly pointed out a lesion involving the biliary tree. The gas in the liver is very suggestive of a fistula between some part of the biliary tree and the duodenum, the prerequisite for a gallstone ileus. There are a number of features here that would go with the diagnosis of gallstone obstruction, such as the long story, the yellow skin, and the fact that there was definite obstruction of the small bowel; I shall therefore make that my diagnosis. The diagnosis is intestinal obstruction; this was probably due to a gallstone, and my second bet, which I believe is less likely, is a carcinoma of the splenic flexure.

Clinical Diagnosis

Intestinal obstruction.

Dr. Welch's Diagnosis

Intestinal obstruction, due to gallstone, or to carcinoma of the splenic flexure.

Anatomical Diagnosis

Intestinal obstruction, due to gallstone.

Pathological Discussion

Dr. Tracy B. Mallory: To leave room for discussion, we had to stop this case at the point of the exploratory operation. As soon as the patient had convalesced sufficiently and the obstructive symptoms had disappeared, further investigation was done, which Dr. Hampton will show.

Dr. Hampton: We subsequently outlined the

biliary tree with barium, but I thought that would make it too easy. I held out on you a little. The barium entered the common duct and gall bladder. We made the diagnosis, as Dr. Welch has, of perforation of the gall bladder into the duodenum, and gallstone ileus. The surgeon went in to remove the stone but could not find it. He did examine the small bowel thoroughly, even though the patient was an enormously fat person. Then he thought it must be in the colon at the splenic flexure, because that is where the obstruction was at the time of operation. We demonstrated a nonopaque stone by barium enema in the sigmoid after the operation.

Dr. Mallory: The day after the last x-ray plates were taken, the surgeon performed the final operation — a digital removal of the stone, which had finally reached the rectum.

Dr. Welch: What was the size of the stone?

Dr. Mallory: About 4 by 2.5 cm. — a very large one. It might easily have been permanently stuck at the ileocecal valve. These patients with gallstone ileus, of course, invariably have a fistulous connection between the gall bladder and the duodenum. The stones are too large to pass through the cystic duct, and it is only by the formation of adhesions between the gall bladder and the duodenum, and perforation between the two viscera, that the stones make their way into the small bowel.

Dr. Henry H. Faxon: Is there anything in the history to suggest that the stone had been passed down?

Dr. Mallory: They did not get it very clearly. Certainly the initial part of the story is typical of small-bowel obstruction, and I do not believe that they were able to make a definite transition to large-bowel disease from the symptoms.

Dr. Hampton: The surgeon did say the patient was getting better, but with a positive diagnosis of gallstone ileus he thought it advisable to attempt removal of the stone.

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NATIONAL DEFENSE WEEK

For the past nineteen years, the period from Lincoln's Birthday to Washington's Birthday has been set aside as "National Defense Week." This period has been devoted to acquainting the public with the state and needs of our national defense, and was initiated, sponsored and carried on under the auspices of the Reserve Officers Association of the United States.

Largely owing to the activities of this organization, the public and Congress have been made aware of the need for an adequate Officers Reserve Corps and have been persuaded to appropriate funds for the training of this corps. Funds for this activity, as for all defense activities, were made available in niggardly fashion until 1936, when a somewhat more generous policy made it possible to initiate large-scale army maneuvers.

Throughout its history, this association has had an almost unique record of working wholeheartedly and unselfishly for national defense, with particular stress, of course, on the civilian components of the United States Army. In the development of the Officers Reserve Corps, the medical profession has taken a part of which we should all be proud. The first reserve officers in our army were a small band, numbering less than 300, organized in 1916 as the Medical Reserve Corps. This was the parent of the Officers Reserve Corps, which now has more than 100,000 officers of all arms and services on its rolls, including 15,000 medical officers.

In the activity of the association, doctors everywhere have given generously of their time and, indeed, have in many ways been the backbone of the entire movement. They have made possible the physical examination and immunization of officers throughout the last twenty years. They have spent time in the study of medical tactics —an activity that concerns approximately half the medical officers of any armed force. In Metropolitan Boston, as in other cities, a large medical chapter of the association has provided a nucleus for activities and training of the Medical Department, and two doctors have been presidents of the Massachusetts department of the association.

By July 1, it is expected that our expanded army will have about 9000 medical officers serving for "a year's training." Of these, about two thirds will come from the ranks of the Officers Reserve Corps and will be, for the most part, men who have qualified for their positions by activities outside their professional duties. It seems desirable, at this time, to call attention to the devoted work of those men who are sacrificing a year of their time to occupy important tactical and administrative positions in the Medical Department of our expanded army, so that adequate training may be provided for the younger medical officers and for the selectees assigned to the Medical Department as enlisted personnel. The sacrifice for those who have attained field-officer rank in the

Officers Reserve Corps is even greater, and they have already proved their value in the national-defense program by their current activities. It is to be hoped that their successors, who are now getting their first taste of army training, will grow to appreciate the public service that this group has rendered and is rendering, and will carry on so that the Medical Department will be properly manned not only professionally but in regard to the administrative and tactical framework that is necessary for bringing medical service to the sick and wounded.

WAR MEDICINE

THE appearance in late January of the first issue of a bimonthly publication, *War Medicine,* represents a response on the part of the Division of Medical Sciences of the National Research Council and of the trustees of the American Medical Association to a demand for information concerning the medical problems brought about by the present emergency.

During the spring of 1940, at the instigation of the Surgeons General of the United States Army and Navy, the Division of Medical Sciences of the National Research Council created a number of committees, composed of outstanding physicians, to advise in regard to what should be adopted as routine procedures in particular branches of medicine. As pointed out in an article in the current issue of *War Medicine,* there are, at the moment, six committees, covering medicine, surgery, aviation medicine, transfusions, chemotherapeutic and other agents, and neuropsychiatry, with subcommittees for the more detailed specialties of medical practice and research, especially as they relate to the broader aspects of military medicine.

A seventh committee, the Committee on Information, was created for the purpose of making available to the governmental services in particular and to the medical profession in general the recommendations of the advisory committees and pertinent information gleaned from all sources. In addition to various monographs, manuals and bulletins, this committee suggested the publication of a periodical devoted wholly to medical preparedness and war medicine, an undertaking to which the trustees of the American Medical Association generously agreed. *War Medicine* is the result, with the members of the Committee on Information constituting the editorial board.

Since many of the medical problems of preparedness and war have little to do with those of civilian practice, this journal should prove to be of great value to all physicians who have or may become responsible for the medical care of members of the services and of industrial workers and their families — and this is likely to include every physician in the United States.

OBITUARY

FRED ELLSWORTH CLOW

1881 - 1941

The practice of medicine, thank God, can produce strong men: men able to spread the gospel of truth and integrity over the four corners of the land. Fred Ellsworth Clow was one of these.

He graduated from the Harvard Medical School in 1904, a New Englander all the way back to the beginning and proud of it. He saw things straight and never compromised with his conscience.

He served as intern at the Elliott Hospital in Manchester and then returned to Wolfeboro, where he belonged. There is a Clow Hill at East Wolfeboro, and an old homestead, going back, I believe, to that Clow who left Wolfeboro in 1775 to go to the War.

Fred Clow became a tower of medical strength in his part of New Hampshire. He did everything that could be expected of an intelligent, energetic, vitally alive doctor. He had a large practice. On the day of his funeral, flags all over the town were at half mast, and the schools and stores and offices of the village were closed. No one in the town could go about his ordinary business at such a time.

Fred Clow had a hand in almost everything in the way of progress that was going on in his community. He had been secretary-treasurer of the New Hampshire Board of Registration in Medicine. He took an active interest in the affairs of the New Hampshire Medical Society, serving as speaker of the House of Delegates and on a variety of committees. He was health officer in Wolfeboro, and at one time, president of the Carroll County Medical Society. He was a deacon of the First Congregational Church and had served as presi-

dent of the Wolfeboro Rotary Club. Of all his accomplishments he was proudest of having built up the Huggins Hospital into a model community hospital, perfectly equipped and effectively run.

He believed in keeping up with the times. He regularly attended the meetings of the American Medical Association and the American College of Physicians, and he went abroad a couple of times to see what was going on in the medical world of Europe. Hence he had a wide medical friendship.

He had an incisive way of speaking, with a shrewd ability to separate what was false from what was true; and an insight into human nature so that he could ferret out dishonesty and chicanery. He was an admirer of Abraham Lincoln and a keen student of his writings. Perhaps he acquired some of Lincoln's characteristics by being so familiar with them.

Fred Clow died when he was only fifty-nine years old. But in a sense he is not dead, for his influence will be felt in New England medicine for many years to come. R. F.

MEDICAL EPONYM

Von Graefe's Sign

This was described by Albrecht v. Graefe (1828–1870) at a meeting of the Berlin Medical Society on March 9, 1864, and was reported in the *Deutsche Klinik* (**16**:158, 1864), under the title "Ueber Basedow'sche Krankheit [Concerning Basedow's Disease]." A portion of the translation follows:

> When we cause the healthy person to look up and down, the upper eyelid moves correspondingly. In those suffering with Basedow's disease, this motion is almost completely abolished or reduced to a minimum: that is, when the cornea is turned downward, the upper eyelid does not follow. This is not a direct result of the exophthalmos, because in the presence of tumors of the orbit or other causes of protrusion, the symptom is frequently absent, although in very marked degrees the motions of the lid are naturally interfered with. On the other hand, it is present in the mildest degree of exophthalmos in Basedow's disease. . . . It is apparently to be regarded as a peculiar disturbance of the innervation of the muscles of the eyelid.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

RESOLUTION ON THE DEATH OF DR. EDWARD MELLUS

The medical profession, as well as the entire citizenry of Newton, has suffered a severe loss in the sudden passing of Dr. Edward Mellus on December 7, 1940.

Dr. Mellus was born in Zumbrota, Minnesota, sixty-eight years ago, and when a boy lived in Newton for two years attending the Newton High School with the Class of 1890. He attended the fiftieth reunion of that class two days before his death. He graduated from Worcester High School in 1891, Harvard College in 1895 and Harvard Medical School in 1898. He enlisted at once in the Medical Corps of the United States Army and served in Cuba during the Spanish-American War.

On his return to Massachusetts he became resident physician at several state hospitals for the insane, including Mattapan, Foxboro and Worcester. He next assumed the management of the Paine Sanitarium at West Newton, and later moved this institution for nervous and mental cases to the Hopewell estate on Waverley Avenue. He retired from active practice in 1929, but still was often called for consultation for mental and nervous conditions. He was the consulting psychiatrist for the Newton Hospital from 1929 until his death.

His activities were not limited to professional interests. He served as a member of the Newton Planning Board and of the Newton Board of Health. He was a 32nd degree Mason, a Shriner and member of the Rotary Club of Newton, of the Hunnewell Club, of the Newton Medical Club, of which he was a past president, of the Massachusetts Medical Society and of the New England Society of Psychiatry.

He was richly endowed by nature, education and experience and contributed generously to every organization to which he belonged. He will long be remembered as a genial companion, possessing rare wit and ready repartee, which enlivened any assembly at which he was present. But the greatest contribution was his effort to improve the diagnosis, care and possible relief of that large and much misunderstood group who suffer from mental deficiencies and diseases. His kindly manner and gentle technic, sustained by a wealth of scientific knowledge and genuine sympathy for the afflicted, endeared him to his professional associates, the public and, most of all, to that special group who consulted him for advice and assistance.

Frank R. Clark, M.D.,
Edward D. Leonard, M.D.,
Harold G. Giddings, M.D.,
Resolution Committee, Newton Hospital.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

FORCEPS DELIVERY IN A PATIENT WITH MITRAL STENOSIS

Mrs. B. P., a twenty-seven-year-old primipara, was first seen on December 29, 1939, when she was approximately eight weeks pregnant.

The family history was noncontributory. The patient had had rheumatic fever at the age of twelve and had also had the usual childhood diseases. The tonsils had been removed. Catamenia began at fourteen, were regular with a twenty-eight-day cycle and lasted seven days without pain. The last regular period began on November 4, making the expected date of confinement, August 11, 1940.

Physical examination at the time of her first visit showed a well-developed and well-nourished woman. The weight was 124 pounds. The heart showed definite evidence of disease. The lungs were clear and resonant; there were no rales. The blood pressure was 160 systolic, 60 diastolic. Vaginal examination showed that the fundus was anterior and that the patient was probably pregnant. Because of the definite cardiac abnormality the possible seriousness of the situation was discussed with the patient and a consultation with a cardiologist was advised and accepted.

The consultant's note read as follows: "The patient has a moderately enlarged heart, a systolic murmur, and a late crescendo mitral diastolic murmur. The blood pressure is 160 systolic, 40 to 10 diastolic. She has, then, mitral stenosis, with aortic regurgitation. The electrocardiogram is not informative." The consultant considered it not unreasonable for the patient to continue pregnancy, since she had had no history of decompensation. He advised her to observe the usual restrictions of a cardiac patient and to be followed closely throughout pregnancy.

The patient was seen by the obstetrician and the cardiologist frequently during her pregnancy, which progressed normally. The total weight gain was 17 pounds. There were no cardiac symptoms except that during a cold she developed a good deal of discomfort over the precordium, an elevation of the pulse and a cough.

On July 31, 1940, following an office visit, the patient had a slight bloody discharge and was sent into the hospital. The next morning the membranes ruptured spontaneously, and good labor began about noon. She was given 1/6 gr. morphine and 1/200 gr. scopolamine. At 1:30 p.m., the cervix was extremely soft, flat and dilated sufficiently to admit three fingers. The progress of labor was not rapid, and she was delivered shortly after 4:00 p.m. by simple forceps under nitrous oxide, oxygen and ether anesthesia of a living male child weighing 8 pounds, 1 ounce. The convalescence was uneventful.

The patient was seen in the office on September 25. The condition of the heart was as before; there was no evidence of increased damage.

Comment. This case of heart disease was recognized by the obstetrician and immediately referred to a cardiologist. The patient was advised to take much more rest than the ordinary patient from the very beginning of her pregnancy, and at times she was in bed the better part of two or three days every week. At no time was there any evidence of decompensation.

Induction of labor was entertained when the patient was approximately thirty-eight weeks pregnant. Spontaneous labor, however, began the next day, and although the labor was not so short as had been anticipated, the heart withstood the strain, and there were no cardiac complications. The patient was given morphine, scopolamine and nitrous oxide, oxygen and ether anesthesia, but no other medication.

The present opinion that labor in cardiac patients rarely induces decompensation was borne out in this case. Had the head not been in the pelvis or had labor started with an unobliterated cervix, cesarean section would have been considered. When the head is well engaged and the cervix is obliterated and propitious before labor starts, vaginal delivery is now generally considered the more conservative procedure.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning February 23:

MIDDLESEX EAST

Tuesday, February 25, at 4:15 p.m., at the Melrose Hospital, Melrose. Head Colds and Complications. Instructor: Charles T. Porter. Walter H. Flanders, *Chairman.*

MIDDLESEX SOUTH

Tuesday, February 25, at 4:00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. Recent Advances in Medical Therapeutics. Instructor: G. Philip Grabfield. Dudley Merrill, *Chairman.*

NORFOLK

Thursday, February 27, at 8:30 p.m., at the Norwood Hospital, Norwood. Pediatric Case Discussions. Instructor: Louis K. Diamond. Hugo B. C. Riemer, *Chairman.*

NORFOLK SOUTH

Monday, February 24, at 8:30 p.m., at the Quincy City Hospital, Quincy. Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis. Instructor: Francis M. Thurmon. David L. Belding, *Chairman.*

SUFFOLK

Thursday, February 27, at 4:30 p.m., in John Ware Hall, Boston Medical Library. Obstetric Complications with Case Histories and Clinical Problems. Instructor: Judson A. Smith. Reginald Fitz, *Chairman.*

NEW HAMPSHIRE MEDICAL SOCIETY

DEATHS

CLOW — Fred E. Clow, M.D., died suddenly Saturday, January 4, at his home in Wolfeboro, in his sixtieth year. He was born in East Wolfeboro, the only son of Stephen W. and Carrie (Canney) Clow. He graduated from Brewster Academy in 1900 and received his degree from Harvard Medical School in 1904. Through his vision, foresight and energy, the Huggins Hospital was established in 1907, and it was largely through his effort that the present modern hospital was erected in 1925.

Dr. Clow was secretary-treasurer of the New Hampshire Board of Registration in Medicine, trustee of Brewster Academy, fellow of the American College of Physicians and member of the American Medical Association, the New Hampshire Medical Society and the Carroll County Medical Society.

Survivors are four children: Mrs. W. J. Paul Dye, of Wolfeboro; Mrs. Joseph Culick, of Exeter; and Stephen E. Clow and Dr. John H. Clow, of Rochester.

HUBBARD — Osmon H. Hubbard, M.D., of Keene, aged seventy-eight, died suddenly at his home on January 5. He was born in Sullivan, July 23, 1862, a son of Mr. and Mrs. George C. Hubbard. He graduated from McGill University Faculty of Medicine in 1888, and had practiced in Fitzwilliam, Walpole and Needham, Massachusetts, and in Gilsum and Keene, New Hampshire. Dr. Hubbard had specialized in diseases of the nose, throat and ears for many years and had given up this more active work to become pathologist at the Elliot Community Hospital about a year ago. He was a fellow of the New Hampshire Medical Society and of the American Medical Association.

Dr. Hubbard is survived by one brother, Charles L. Hubbard, of Jamaica Plain, Massachusetts.

MacKENZIE — Nicholas Y. B. MacKenzie, M.D., of Andover, died November 27, 1940. He was in his sixty-sixth year.

Born in Ellsworth, Maine, Dr. MacKenzie received his degree from Dartmouth Medical School in 1901. He interned in New York and Boston hospitals and settled in Andover in 1917, after having practiced in Salisbury and Gilmanton.

His widow and six children survive him.

MISCELLANY

PHYSICIANS' GROUP OVER THE TOP

The Physicians' Group more than contributed its quota in the recent drive of the Greater Boston Community Fund. With the total set at $20,500, approximately seven hundred physicians contributed $20,795, or 101.4 per cent of the quota.

JOHN PHILLIPS MEMORIAL AWARD

On the recommendation of the Committee on Fellowships and Awards, the Board of Regents of the American College of Physicians, by unanimous resolution, has voted that the John Phillips Memorial Medal for 1941 be awarded to Dr. William C. Stadie, associate professor of research medicine, University of Pennsylvania, for his significant contributions to the knowledge of anoxia, cyanosis and the physical chemistry of hemoglobin, and more especially for his recent studies on the subject of fat metabolism in diabetes mellitus.

This award was established on October 27, 1929, to be given periodically for some outstanding piece of work in internal medicine. Internal medicine is interpreted to include not only clinical science, but all subjects that have a direct bearing on the advance of clinical science. The work must be done in whole or in part in the United States or in Canada.

Nominations for the award are made to the Committee on Fellowships and Awards of the American College of Physicians. The recipient must file a written account of his work, and must present his results as a paper before the annual session, at which time the award of a bronze medal is made by the president.

AID FOR PHYSICIANS' CHILDREN IN ENGLAND

The Physicians' Wives League of Greater New York, 25 East 86th Street, has raised among its members $150 which has been contributed through the Save the Children Federation "to assist five physicians' children among the child victims of the war in Great Britain." This donation is a part of the money transmitted to England in the federation's nation-wide endeavor to provide American godparents for British and other children now being cared for in England at the rate of $2.50 per month for each child. Nearly 6000 children who have been bombed from their own homes or who have otherwise suffered in the war now have this American godparent assistance.

Many physicians, surgeons, nurses and others connected with the profession are among the godparents, who represent every state in the Union. The federation's headquarters are in the Metropolitan Tower, 1 Madison Avenue, New York City.

CORRESPONDENCE

GONOCOCCUS COMPLEMENT-FIXATION TESTS

To the Editor: At its meeting on January 21, the Public Health Council voted that, in view of the rapidly increasing burden of work at the Wassermann Laboratory and the questionable value of the gonococcus complement-fixation test, the routine performance of these tests should be discontinued. In order to give physicians due notice of this action, it is planned to continue the routine performance of these tests on request through the month of Feb-

ruary. Beginning March 1, however, these tests will no longer be performed.

PAUL J. JAKMAUH, M.D.,
Commissioner of Public Health.

State House,
Boston.

REQUEST FOR INFORMATION IN REGARD TO THE NUMBER OF DIABETIC CHILDREN IN MASSACHUSETTS

To the Editor: There are many diabetic children under the age of fifteen years in Massachusetts, but how many no one knows. The number is increasing, because formerly they lived only one or two years but now they enter manhood and womanhood.

If we knew how many of these children there were in the State we should all be in a better position to advise as to their future.

I should consider it a great favor if any of your readers would notify me if they now know or have under their care any diabetic children under the age of fifteen. To save duplication I should appreciate the following data:

1. Name or initials of the child
2. Residence (city or town)
3. Sex
4. Race or nationality
5. Year of birth (age)
6. Year of onset of diabetes (duration)

Signed (physician or hospital)
Address

On receipt of a postal card I shall gladly send cards made out as above to any physician or hospital, but the number of children in the State is so small that I hesitate to send out letters like this with envelopes for reply to each of the 7839 physicians in Massachusetts.

ELLIOTT P. JOSLIN, M.D.

81 Bay State Road,
Boston.

REPORT OF MEETING

HARVARD MEDICAL SOCIETY

A regular meeting of the Harvard Medical Society was held at the Peter Bent Brigham Hospital on November 26, 1940, with Dr. Elliott C. Cutler presiding.

The first case, presented by the Surgical Service, was that of a young man with a history compatible with that of peptic ulcer, who entered with signs and symptoms of diffuse peritonitis. Roentgenograms demonstrated air under both diaphragms, and an operation was performed. At that time a perforation of a Peyer's patch, secondary to typhoidal infection, was found. The abdomen was closed without drainage, and the patient was put on Ochsner's regimen, with Wangensteen drainage, 100 per cent oxygen, Fowler's position, and morphine at regular intervals. The serum protein never fell below 5.9 gm. per 100 cc. The patient was given several blood transfusions and made a satisfactory recovery.

The second case, presented by the Medical Service, was that of a thirty-three-year-old woman who had drunk moderate amounts of alcohol for fifteen years and extremely large amounts for the previous five or six years. She had eaten very little food for a few months, and had noticed nausea and vomiting for the last five days. There had been increasing constipation for six months, with an increase in girth for one month and obstipation for seven days. She had recently been disorientated and noisy at night. Physical examination revealed puffy cheeks, with telangiectases. The patient was disorientated, with visual hallucinations and confabulation. The scleras were jaundiced, horizontal eye movements were poor, the tongue was smooth and red, and there were pulmonary emphysema, doughy edema and an enlarged abdomen. The temperature was 101°F., the pulse 140, and the respirations 20. The icteric index was 15, the venous pressure 130 mm. of water, the circulation time 14 seconds, the red-cell count 3,500,000 with a hemoglobin of 85 per cent, and the white-cell count 17,000. The urine had a slight trace of albumin, the white blood cells in the sediment increasing from 5 to 50 per high-power field after admission. The blood urea nitrogen, originally 74 mg. per 100 cc., rose to 91 mg. Further examination of the abdomen revealed distended loops of bowel, normal peristalsis, and tenderness in the right upper quadrant, with no liver dullness. There were hypesthesias of the lower arms and legs, a loss of fine movements, sluggish tendon reflexes and tender calf muscles. The course under intensive vitamin therapy was one of clinical improvement, although there were still some hallucinations. Dr. Elliott C. Cutler suggested that the gas in the bowel might be on a neurologic basis and that novocain injection of the spinal cord should probably have been tried. Dr. John Romano stated that the patient had a definite Korsakoff syndrome, with a question of Wernicke's syndrome. Dr. Soma Weiss remarked that abdominal distention from acute or chronic alcoholism is not uncommon and may possibly be of neurologic origin. On the other hand, alcoholic patients may rupture an ulcer or appendix during a spree, presenting themselves later with distention and no spasm.

Dr. Jacob Fine, of the Beth Israel Hospital, addressed the society on "Clinical and Experimental Studies in Intestinal Obstruction." He pointed out that to simplify the study of intestinal obstruction it is best to omit a consideration of its complications, that is, strangulation and peritonitis. These are of clinical importance, but serve only to confuse an understanding of the basic processes involved. Most of the experimental work on the etiology of intestinal obstruction centers around a search for a circulating toxin, or an effort to explain all the phenomena involved by water and electrolyte imbalance. The evidence for a toxin remains unconvincing, and clinical experience has demonstrated the inadequacy of therapy for chloride, water and sodium imbalance. Uncomplicated high intestinal obstruction is consistent with life until death from starvation ensues, so long as water and electrolytes are adequately replaced. If the deficiency of these substances were the crucial factor in uncomplicated intestinal obstruction, it should be possible to maintain life in low obstruction of the small intestine for as long a time by similar therapy. Since this has not been possible, the assumption is that there is a basic difference between the two levels of obstruction. That difference consists in the ability of the bowel to decompress itself more effectively when the obstruction is high than when it is low, so that what seems of primary significance is the increase in intraintestinal pressure. The large literature on the effects of increased pressure is confusing because of conflicting results. Many of the conclusions drawn are not convincing for the reason that the pressures used were far in excess of those known to exist clinically in the intestine during obstruction. Another difficulty is the variety of technics utilized. Dr. Fine presented the following simple procedure, which has formed the basis of his studies: the small bowel or the stomach and small bowel of a cat, free of fluid and gas, is tied off at both ends, thus

preventing access to swallowed air or to fluid, except secretions; in other words the intestine is converted into an empty, closed loop.

Such a loop remains substantially free of gas and fluid after one or more days. Examination of such loops shows some edema and engorgement at the caudal end. Otherwise the bowel is normal, and there is no peritonitis. If a similar loop, with the stomach excluded, is distended with nitrogen under slight positive pressure, the volume of gas injected remains about the same after twenty-four hours; if the animal is caused to breathe pure oxygen continuously from the time of inflation of the loop, the volume of gas after twenty-four hours averages 40 per cent of the original. The amount of fluid recovered from such loops, whether the animals breathe air or oxygen, is negligible. If the pressure in an empty collapsed loop is gradually raised for six hours by a constant stream of air or nitrogen and if the loop is allowed to decompress itself spontaneously, the pressure falls slightly or moderately and death results in an average of fourteen hours. The survival time is inversely proportional to the height of the final pressure. But if in a similar group of experiments the animal is given pure oxygen to breathe at the time when spontaneous decompression begins, the intraintestinal pressure falls steadily toward zero, and the survival time is very much prolonged. This effect of oxygen cannot be attributed to the general sustaining qualities of oxygen but, as a number of previous publications have shown, to the fact that breathing pure oxygen facilitates an increased rate of absorption of nitrogen. The difference in the average amount of peritoneal and intraintestinal fluid between the animals breathing air and oxygen was 16 cc., so that the more rapid death of the air-breathing animals cannot be explained on the basis of a greater fluid loss. In previous experiments in which a variety of foods were introduced into such loops, the time of survival was proportional not so much to the fluid loss or to the volume of gas as to the rapidity with which tension developed. In general the shortest survival times were associated with the highest tensions. It is obvious that the kind and amount of food present in the intestine at the time obstruction begins, or swallowed during the course of the process, determine to a considerable extent the intraintestinal pressure and the progress of the disease.

Death occurred in the experiments with empty loops distended with nitrogen in the absence of a significant loss of water and electrolytes, plasma or blood into the peritoneal cavity or bowel. The total fluid recovered in air-breathing animals from the peritoneal cavity, bowel wall and bowel lumen averaged 37 cc., in the oxygen-breathing animals 21 cc., and in control animals with undistended loops 11 cc. Such fluid losses cannot account for death, even though they may be regarded as contributory.

In a search for other causes for the death produced by increased intraintestinal pressure, the problem was viewed in terms of the effects of distention, which is a necessary concomitant of increased pressure. The femoral venous pressure showed a marked rise in all experimental animals with distention. But no clear evidence of fluid loss into the lower extremities was demonstrable. A simultaneous study of plasma-volume changes, however, showed that plasma was being lost in substantial quantities. In dogs the loss reached as much as 55 per cent, which is sufficient to explain death. Occasionally such a loss was observed when only a few feet of small intestine were distended, so that the factor of distention of the peritoneal cavity seems to have been excluded. Plasma loss in peritoneal distention was occasionally observed, but the loss was usually not sustained. Furthermore, distention of the colon in dogs, which produces a marked distention of the peritoneal cavity, was not accompanied by plasma loss. The plasma loss in obstruction of the small intestine was therefore considered specific for that part. Indeed, at least so far as local plasma loss is concerned, clinical observation shows that an excess of peritoneal fluid is not a prominent factor in obstruction of the colon, but is not infrequently seen in advanced small-bowel obstruction.

It therefore appears that although part of the plasma is lost in the gastrointestinal tract and peritoneal cavity, the amount recoverable from these areas is only a fraction of the total amount lost, which, in animals at least, is extensive enough to explain death.

That plasma loss is a direct effect of distention was shown in the recovery of plasma volume following the institution of decompression. Plasma replacement in a group of dogs definitely prolonged their lives for a period comparable to that of undistended dogs otherwise treated in the same fashion. Replacement of lost plasma by intravenous saline did not prolong life. Some of the results detailed above, especially the loss of plasma during obstruction with distention and return of lost plasma on relief of the distention, have been confirmed in patients.

Acute plasma loss is common to many rapidly fatal conditions, but it cannot be regarded as a nonspecific terminal event in intestinal obstruction, because the loss of plasma in such cases is large and significant from the very onset of the distention. The analogy between intestinal obstruction and traumatic shock recalls various efforts to explain shock on a neurogenic basis. The evidence for the protective effect of denervation of distended loops was not confirmed in the experiments in which the denervation consisted of removal of the celiac ganglion and division of both vagus nerves.

SPECIAL NOTICE

MASSACHUSETTS MEDICAL SOCIETY: COMMITTEE ON STATE AND NATIONAL LEGISLATION

The following bills are scheduled for hearings the week of February 24:

February 25

S. 485 (Public Health). Petition of Robert T. Monroe proposing legislation relative to admission to licensed practice of medicine. This bill makes requirements for registration in medicine the same as the National Board of Medical Examiners. *Favored.*

H. 1564 (Public Health). Same as S. 485.

S. 560 (Public Health). Petition of Bertram A. Harris and others for legislation relative to the qualifications of applicants for registration as qualified physicians and examinations thereof. This bill annuls the power of the Approving Authority. *Opposed.*

H. 114 (Public Health). Bill (accompanying H. 113, recommendations of the Board of Registration in Medicine) relative to providing for the annual registration of physicians and the biennial publication of the list of physicians duly registered — the perennial annual-registration bill. *Opposed.*

H. 115 (Public Health). Bill (accompanying H. 113, recommendations of the Board of Registration in Medicine) relative to the recording of the certificate of registration of a qualified physician by the town clerk. This bill only adds a new penalty to existing laws. *Opposed.*

H. 116 (Public Health). Bill (accompanying H. 113,

recommendations of the Board of Registration in Medicine) relative to establishing a special commission to investigate and study the advisability and practicability of requiring special qualifications of all physicians who engage in the practice of surgery. This should be handled by the Massachusetts Medical Society; it is a matter of education rather than one of legislation. *Opposed.*

H. 272 (Public Health). Petition of Harold W. Sullivan that there be appropriated from the treasury of the Commonwealth the sum of twenty-five thousand dollars to provide for an investigation by the Board of Registration in Medicine relative to the practice of medicine. Under the present law the Board has adequate power to investigate, and funds should be obtained in the usual way. *Opposed.*

H. 611 (Public Health). Petition of James A. Vahey for legislation relative to the qualifications for applicants for registration as qualified physicians. This bill postpones the effective date of the Approving Authority from 1941 to 1945. *Opposed.*

H. 1229 (Public Health). Petition of Domenic Staziani for legislation to protect persons needing medical care and relative to the registration of students of medicine. *Opposed* (as drawn).

February 26

S. 502 (State Administration). Petition of Joseph C. Basso for legislation to provide for the regulation of the practice of osteopathy and for the establishment of a state board of osteopathic examination and registration. *Opposed.*

February 27

H. 609 (Public Health). Petition of Annie D. Brown for legislation to provide further for regulating the practice of physicians and surgeons. A perennial impracticable bill. *Opposed.*

H. 610 (Public Health). Petition of Annie D. Brown for amendment of the law regulating the practice of physicians and surgeons in certain cases. A perennial impracticable bill. *Opposed.*

H. 1838 (Public Health). Petition of J. Arthur Moriarty and others for legislation to provide for nonprofit medical-service plans. The White Cross bill. *No action.*

NOTICES

BOSTON GASTROENTEROLOGICAL SOCIETY

There will be a meeting of the Boston Gastroenterological Society in the amphitheater of the Beth Israel Hospital on Wednesday, February 26, at 12 noon. An x-ray conference on gastrointestinal diseases by Dr. Samuel A. Robins and his associates will take place.

GREATER BOSTON MEDICAL SOCIETY

The next meeting of the Greater Boston Medical Society will take place on Tuesday, March 4, in the auditorium of the Beth Israel Hospital at 8:15 p.m.

PROGRAM

Factors that May Induce Cardiac Infarction. Dr. Ernst P. Boas, assistant professor of medicine, Columbia University College of Physicians and Surgeons. Discussion will follow by Drs. Herrman L. Blumgart, Samuel A. Levine and Samuel H. Proger.

BOSTON MEDICAL HISTORY CLUB

The next meeting of the Boston Medical History Club will take place on Monday, February 24, at the Boston Medical Library, 8 Fenway, Boston, at 8:15 p.m. Dr. Alan R. Moritz will speak on "Peaks in the History of Legal Medicine."

All interested persons are cordially invited to attend.

JEWISH MEMORIAL HOSPITAL

There will be a staff meeting of the Jewish Memorial Hospital in the hospital auditorium, 45 Townsend Street, Roxbury, on Thursday, February 27, at 8:30 p.m.

PROGRAM

Some Important Errors in the Diagnosis of Heart Disease. Dr. Samuel A. Levine.

Collation.

The medical profession is invited to attend.

JOHN T. BOTTOMLEY SOCIETY

The regular monthly meeting of the John T. Bottomley Society will be held in the Out-Patient Building of the Carney Hospital on Tuesday, March 4, at 11:30 a.m. Dr. Herbert Finn will speak on "Some Recent Advances in Surgery."

Physicians and students are cordially invited to attend.

TUFTS COLLEGE MEDICAL SCHOOL ALUMNI ASSOCIATION

The forty-seventh anniversary of the Tufts College Medical School Alumni Association will be celebrated at its annual dinner on Wednesday, March 26, at 7 p.m., at the Hotel Somerset, Boston.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Salem	March 3	Harold C. Bean
Haverhill	March 5	William T. Green
Lowell	March 7	Albert H. Brewster
Gardner	March 11	Mark H. Rogers
Brockton	March 13	George W. Van Gorder
Pittsfield	March 17	Frank A. Slowick
Northampton	March 19	Garry deN. Hough, Jr.
Worcester	March 21	John W. O'Meara
Fall River	March 24	Eugene A. McCarthy
Hyannis	March 25	Paul L. Norton

NEW ENGLAND ROENTGEN RAY SOCIETY

The next meeting of the New England Roentgen Ray Society will be held in John Ware Hall, Boston Medical Library, on Friday, February 28, at 8:30 p.m.

PROGRAM

Spinal-Canal Block as Demonstrated by Air Myelography. Dr. Wendell C. Hall.

Heavy-Metal Lines in Epiphyseal Ends of Growing Bones. Dr. Ralph T. Ogden.

Osteitis Tuberculosa Multiplex Cystica. Dr. Max Climan.

Roentgen Diagnosis in Neurocutaneous Syndromes. Dr. Gilbert W. Heublein.

Atypical Bone Tumors. Dr. Douglas J. Roberts.

NEW ENGLAND OTO-LARYNGOLOGICAL SOCIETY

The regular spring meeting of the New England Oto-Laryngological Society will be held on Wednesday, March 19, at the Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston, at 4 p.m. The evening program will be devoted to a symposium on "The Management of Some of the Complications Arising from Acute and Chronic Otitis Media." Discussion will follow by Drs. Harold Tobey, Charles T. Porter, Maxwell Finland, Champ Lyons, W. Jason Mixter and Charles S. Kubik.

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

Medical Inspector of Schools and Working Children, Health Department, North Adams, $1500 a Year

Director of State Civil Service, Ulysses J. Lupien, has recently announced that a competitive examination is to be held on April 5 in order to find eligibles for appointment to the position of medical inspector of schools and working children, Health Department, North Adams.

The entrance requirements are as follows: applicants must be registered physicians under the State Board of Registration in Medicine. The subjects and weights of the examination are as follows: training and experience, 2; practical questions, 3; total, 5. Applicants must obtain a grade of 70 per cent in each subject in order to become eligible. The last date for filing applications is Saturday, March 22, at 12 o'clock noon.

SIXTH ANNUAL POSTGRADUATE INSTITUTE OF THE PHILADELPHIA COUNTY MEDICAL SOCIETY

The Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society will take place from March 31 to April 4 at the Bellevue–Stratford Hotel, Philadelphia. "Symposiums on Modern Therapy" will be the title of the meeting. Further information may be obtained by writing to Postgraduate Institute, Philadelphia County Medical Society, 301 South Twenty-First Street, Philadelphia, Pennsylvania.

SOCIETY MEETINGS AND CONFERENCES

Calendar of Boston District for the Week Beginning Sunday, February 23

Sunday, February 23

†4 p.m. Fatigue and Health. Dr. David B. Dill. Free public lecture. Harvard Medical School, Building D.

†4 p.m. Your Nose and Your Throat: What about them? Dr. Edmund J. Butler. Cambridge Hospital, Margaret Jewett Hall.

Monday, February 24

12:15–1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

*8:15 p.m. New England Heart Association. Beth Israel Hospital.

†8:15 p.m. Peaks in the History of Legal Medicine. Dr. Alan R. Moritz. Boston Medical History Club. Boston Medical Library, 8 Fenway.

Tuesday, February 25

*9–10 a.m. X-ray demonstration. Dr. Alice Ettinger. Joseph H. Pratt Diagnostic Hospital.

12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital amphitheater.

Wednesday, February 26

*9–10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*12 m. Clinicopathological conference. Children's Hospital.

12 m. Boston Gastroenterological Society. Beth Israel Hospital.

*2–4 p.m. Hematuria and Dysuria. Drs. W. C. Quinby and E. A. Stead. Peter Bent Brigham Hospital.

Thursday, February 27

*8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital.

*9–10 a.m. Gastrointestinal clinic. Dr. K. S. Andrews. Joseph H. Pratt Diagnostic Hospital.

8:15 p.m. New England Section of the American Urological Association. Harvard Club of Boston.

*8:30 p.m. Some Important Errors in the Diagnosis of Heart Disease. Dr. Samuel A. Levine. Jewish Memorial Hospital, 45 Townsend Street, Roxbury.

Friday, February 28

*9–10 a.m. Amenorrhea and Abnormal Bleeding. Dr. J. V. Meigs. Joseph H. Pratt Diagnostic Hospital.

8:15 p.m. Massachusetts Memorial Hospitals. Evans Memorial Auditorium.

8:30 p.m. New England Roentgen Ray Society. Boston Medical Library, 8 Fenway.

*Open to the medical profession.
†Open to the public.

March 4 — Greater Boston Medical Society. Page 348.

March 4 — John T. Bottomley Society. Page 348.

March 8 — American Board of Ophthalmology. Page 201, issue of August 1.

March 12–14 — New England Hospital Assembly. Hotel Statler, Boston.

March 13 — Pentucket Association of Physicians. Page 263, issue of August 15.

March 19 — New England Oto-Laryngological Society. Notice above.

March 21–22 — New York University College of Medicine, Alumni Day. Page 135, issue of January 16.

April 21–25 — American College of Physicians. Page 1065, issue of June 20.

March 26 — Tufts College Medical School Alumni Association. Page 348.

March 31–April 4 — Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society. Notice above.

April 28–30 — American Academy of Physical Medicine. Scientific session. Hotel Pennsylvania, New York City.

May 21, 22 — Massachusetts Medical Society, Boston.

May 28–June 2 — American Board of Obstetrics and Gynecology. Page 262, issue of February 6.

June 2–6 — American Medical Association. Cleveland, Ohio.

October 14–17 — American Public Health Association. Page 135, issue of January 16.

District Medical Societies

ESSEX SOUTH

March 5 — X-ray in Heart Disease. Dr. Merrill C. Sosman. Essex Sanatorium, Middleton.

April 2 — Pediatric Problems in General Practice. Dr. Joseph Garland. Addison Gilbert Hospital, Gloucester.

May 14 — Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

March 11.

May 13.

Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

February 25 — Page 304, issue of February 13.

March 25 — To be announced.

May 8 — Censors' meeting. Hotel Puritan.

SUFFOLK

April 30 — Page 604, issue of October 10.

May 1 — Censors' meeting. Page 261, issue of February 6.

WORCESTER

March 12 — Memorial Hospital, Worcester.

April 9 — Hahnemann Hospital, Worcester.

Supper at 6:30 p.m. followed by a business meeting and scientific program.

BOOK REVIEWS

Manual of Medical and Surgical Emergencies. Edited by J. C. Geiger, M.D. 8°, cloth, 199 pp. San Francisco: J. W. Stacey, Incorporated. $2.50.

This work is a compilation of facts about medical and surgical emergencies in a single, handy volume. The

need for such a book is rather limited. It should be of most assistance to the beginner on an emergency service of any large city hospital, where quick decisions are so often necessary.

Simplified Diabetic Manual, with 163 International Recipes (American, Jewish, French, German, Italian, Armenian and so forth). By Abraham Rudy, M.D. Introduction by Frederick M. Allen, M.D. 8°, 216 pp., with tables, charts and illustrations. New York: M. Barrows and Company, Incorporated, 1940. $2.00.

The new edition of this useful manual, formerly entitled *Practical Handbook for Diabetic Patients,* presents many diet forms adapted to the dietary customs of patients of many nationalities. The description of the use of protamine zinc insulin and crystalline insulin, together with a simple discussion of the vitamins, will aid the physician in securing the necessary co-operation of diabetic patients.

The Diagnosis and Treatment of Pulmonary Tuberculosis. By John B. Hawes, 2d., M.D.; and Moses J. Stone, M.D. Second edition. With a foreword by Richard C. Cabot, M.D. 8°, cloth, 260 pp., with 75 illustrations. Philadelphia: Lea and Febiger, 1940. $2.75.

Following the death of the senior author, this book now appears in a second edition, revised by Dr. Stone. It is still a "brief and concise textbook," as the first edition was intended to be, and will serve very well as a practical guide for the medical student and the practitioner. Changes in this edition include new chapters on allergy and immunity and on mental aspects of the disease. The chapters on primary tuberculosis, on collapse therapy and on x-ray diagnosis have been considerably revised.

The book will be criticized by some because it is too brief in some sections, whereas in others it includes material that may be considered superfluous. But it makes no claim to completeness, and the best selection of material must inevitably be to some extent a matter of individual judgment. The reviewer believes that the essentials have been adequately presented. And they are presented from the point of view of physicians who have had many years' experience with the disease and with the human beings affected by it. Sound common sense and consideration of the patient as a whole are the dominant notes.

The significance of contact, especially between children and tuberculous adults, is emphasized in relation to the patient's history and to the prevention of tuberculosis. Pleurisy, especially with effusion, is pointed out as being frequently a tuberculous manifestation calling for prolonged bedrest like other forms of tuberculosis, and it is shown that the pulmonary form may often be prevented by the proper care of pleurisy.

There is a simple presentation of the pathology of pulmonary tuberculosis, with a discussion of the exudative and proliferative types. Primary or childhood infections are considered in their clinical, pathological and x-ray aspects, and again the importance of family contact is stressed.

Among the newer developments discussed are improvements in collapse therapy. These include pneumolysis as an aid to pneumothorax, the improved technic of thoracoplasty, the use of bilateral pneumothorax and the abandonment of phrenic operations except for a restricted group of cases. Other advances mentioned are the value of gastric lavage in diagnosis, the more restricted reliance placed on heliotherapy and climate, and the newer conceptions concerning the desirability or undesirability of a positive tuberculin reaction. It is pointed out that a primary infection in an adult is no worse than in a child, and that although it may confer a very slight degree of immunity, it also brings a much greater risk of subsequent reinfection tuberculosis than if the tuberculin reaction had remained negative.

The book is very simply written, and there is a brief summary at the end of each chapter. Also with each chapter are selected references to the literature. The illustrations are clear, and the x-ray photographs well reproduced. An index is included.

The Surgery of the Alimentary Tract. By Sir Hugh Devine, M.S., F.R.A.C.S., F.A.C.S. 8°, cloth, with 690 illustrations, some in color. Baltimore: Williams and Wilkins Company, 1940. $15.00.

One of the common criticisms of surgical volumes is that they are largely compilations, that they are written by men who have the time in which to write but not the experience from which to draw. Such a criticism certainly cannot be made of this volume. It is outstandingly an individual's book, based on personal views and personal experience. It proposes to be that and refreshingly makes no effort to be anything else.

The work deals with but a limited number of surgical subjects, those particularly in which the author has been interested. It presents the views of a man busy in the practice of surgical diagnosis and surgical therapy. Dr. Devine has contributed many original and practical procedures to surgery, and the deductions by a person with such a large experience and with such an original mind are always of great interest and benefit to surgeons similarly occupied. The book is pre-eminently suited for those who have had considerable experience in surgery, but may be read with profit by those whose interests are surgical but who have not as yet had a large experience in it.

Physiology of Micturition: Experimental and clinical studies with suggestions as to diagnosis and treatment. By Orthello R. Langworthy, M.D., Lawrence C. Kolb, M.D., and Lloyd G. Lewis, M.D. 8°, cloth, 232 pp., with 49 illustrations. Baltimore: Williams and Wilkins Company, 1940. $3.50.

This publication adds greatly to our present understanding of normal and abnormal functions of the urinary bladder. It contains the results of many experimental and clinical observations made during a period of seven years in the laboratories of the Johns Hopkins University School of Medicine and in the wards of the Johns Hopkins Hospital. For the first time the correlation between the complicated nerve supply of the bladder and its behavior in various forms of neurologic disease has been put on a logical basis. The literature on this subject, heretofore conflicting, has been carefully evaluated.

The book comprises six sections. The first concerns the anatomy of the urinary apparatus and its nerve supply; the second and third discuss the pharmacology and physiology; the fourth treats abnormalities of urination in diseases of the peripheral nerves and spinal cord; the fifth considers these in diseases of the brain; and the final section presents a summary of clinical experience in diagnosis and treatment.

The book deserves high commendation and will undoubtedly be of special interest to both clinicians and urologists, as well as to teachers of physiology.